MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY (MDEQ) and

THE DOW CHEMICAL COMPANY (Dow)

TRI-CITIES DIOXIN COMMUNITY MEETING

November 28, 2007

6:30 - 9:15 p.m.

Horizons Center, 6200 State Street, Saginaw

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CHUCK NELSON: Good evening. My name is Chuck Nelson. I'm the facilitator for tonight's community meeting. In my day job, I'm a faculty member at Michigan State University in the College of Agriculture and Natural Resources. I want to welcome you all to this quarterly meeting. As you'll note on the agenda, which I hope you picked up as you came in, we have a very busy agenda tonight. This actually runs 15 minutes longer than normal because we had so many newsworthy items, things that folks needed to know about, and we wanted to be insure that we provided ample time at the end for folks to ask questions, make comments, et cetera.

Now for the presenters, I want to say in the most pleasant of terms, when you've hit your time limit, I'm going to say time out and I will give you the sign. I appreciate it. I know everybody works hard to stay on track. Let's do our best so everybody gets a say and at the end folks get opportunities to ask questions, make comments, et cetera.

I would also call your attention to the ground rules that are on the back of the agenda. Many of you have been here and are familiar with them, but it's important that we show respect and we provide our

input at the microphone. The meeting is taped so the microphone is essential for us to have accurate input on what's going on. Our scribe will need to hear clearly what you're saying.

I would also note that there's far more information than we'll get to present tonight. The DEQ's website has enormous amounts of information on this, so please be sure to look there also, and we have put down the schedule for 2008 meetings. This is the tentative schedule. We know the next meeting will be February the 7th. Beyond that, we have three others scheduled in May, August and November. So be sure to get those down on your calendar.

So let's start out with introductions. Folks from the DEQ, State of Michigan would you like to do introductions first and then we'll shift over to Dow because they have the first presentation.

JIM SYGO: Thanks very much, Chuck. Can I get DEQ and Community Health to stand. We'll just run through them very quickly. I'd like to thank everybody for coming out tonight. We have a number of Agency folks here today. Up front is Steve Buda; George Bruchmann, who's Chief of Waste and Hazardous Materials Division; Terry Walkington, who's Chief of our District Office Waste Management Staff; Al Taylor,

the Senior Geologist on this site; Deb MacKenzie-Taylor, the Toxicologist; De Montgomery, who's the Acting Section Chief for the Hazardous Waste Programs; Art Ostaszewski, who's participating in the data collection. Then in the back of the room is Trisha Peters from our District Office, along with Cheryl Howe who's the Project Coordinator for this program, and I think that's all the DEQ staff.

Then we have from the Michigan Department of Community Health Kory Groetsch who's a toxicologist. We also have Linda Dykema and we have Brendan Boyle. He's retired once but he's back here again. So that's everybody from the State of Michigan.

CHUCK NELSON: Jim, could you introduce the EPA folks?

JIM SYGO: Yes. What I'd like to do is introduce Ralph Dollhoph who's been doing a lot of coordination, dealing with the CERCLA issues. He's going to introduce the EPA folks.

RALPH DOLLHOPH: Thank you, Jim. My name is Ralph Dollhoph. I'm the Associate Director of EPA Superfund Edition with Region Five. More specifically, I'm the Associate Director for Emergency Response and Removal Actions. EPA appreciates the opportunity to speak this evening. We appreciate the

invitation from DEQ.

I'd like to introduce to you some of our staff people who have been working on the project and who are here tonight to address you and to respond to your questions. Dr. Milton Clark is the Senior Science Advisor with EPA. Next to Dr. Clark is Wendy Carney who's a Senior Program Manager in the Office of Superfund, more specifically in the Remedial Branch of Superfund. Greg Rudloff is with our Land and Chemicals Division. Greg is someone that I think is familiar to most of you. He has worked on this project over the years in the context of the river corrective action work.

Next to Greg is Brian Schleiger. Brian is an EPA On-Scene Coordinator. He works out of our office in Grosse Ile, Michigan, and his involvement to date has been to help to oversee some of the removal actions at Reaches O, J/K, and D. Jason El-Zein is an Emergency Response Section Team also working out of our Grosse Ile, Michigan office. We also have two Community Involvement Coordinators here tonight. They are Rafael Gonzalez, Rafael here, as well as Briana Bill. They both are Community Involvement Coordinators who work out of our Superfund office in Chicago, and then we have Mr. Nick Hans who's an EPA Press Officer. He

is in the back of the room, and I'm sorry, John Steketee is our representative with our Office of Regional Counsel in Chicago and has worked on the project over the years in the context of the river corrective action work. Thank you.

JIM SYGO: Chuck, I forgot one person. We also have from the Fish and Wildlife Service who's the Trustee Administrator, Lisa Williams, as well. I'm sorry about that.

CHUCK NELSON: Okay. John.

JOHN MUSSER: Thank you, Chuck. Seasons greetings, everyone. Thanks for coming out this evening. Good turnout. I appreciate that. Can I have the Dow team contractors as well as Dow presenters please stand and I'll go around the room here in no particular order.

First is my friend, Tom Long. Tom is a Toxicologist with Sapphire Group. Next is Jim Collins. Jim is our Lead Epidemiologist. Next is Mike Carson our Regional Medical Director. Next is Peter Simon from Ann Arbor Technical Services. Next is Victor Magar. Victor is with the Environ organization. He'll be speaking this evening. Renada Kimbrough, Renada is an international expert on dioxins. She's also an M.D. and has been investigating dioxins

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for quite a long time I understand and also has worked with the CDC, the Center for Disease Control, and also EPA and Human Health Services.

Denise Kay is with ENTRIX working on our ecology side of things. Next is Lesa Alyward from Summit Toxicology. Next is Todd Konechne. Todd is with Dow. He is a remediation project manager and you'll hear from him this evening. Next is Steve Lucas, Dow Remediation Leader, also speaking this evening in regards to remediation activity taking place near our Dow site. Dave Gustafson is in our regulatory affairs group. Next is Greg Cochran. He's the Leader of our Michigan Dioxin Initiative, and last but not least, Peter Wright our legal counsel.

And with that, I'm going to turn it over to you, Peter, and you're all set to go here.

CHUCK NELSON: Before Peter comes up, I would remind you that almost all these folks will be here for a half hour after the meeting. So if you have pressing questions, identify the person you need to talk to and be sure to speak to them afterwards. They'll be here to talk to you.

PETER SIMON: Thanks, John. Good evening. My name is Peter Simon as John mentioned. I'm with

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Ann Arbor Technical Services. I'm the Project Manager for the GeoMorph investigation in the Tittabawassee River. Tonight my goals are to provide you with a general update on where the project is. In addition to that, give you a status update of what the 2007 investigation activities are and give you some idea of what the data presents as of right now.

It's early. This is by no means a presentation to review site characterization. Field crews are just finishing up the field sampling activities for 2007 and I want to give you some idea of what it is that we're seeing so far. In addition to that, show you what the plan for the schedule is for the remainder of 2007 and early 2008.

Just to refresh, the Tittabawassee River study areas have been broken down into three primary study areas, the Upper Tittabawassee River, Reaches A through O. It's roughly 6.5 miles. That's the work that we undertook last year. These areas or these general study areas are generally broken down based on morphology or river morphology. There's some major changes in the river behavior and landscape so to speak as you move from the upper (Tittabawassee River) down into the lower and into the Saginaw River.

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The Middle Tittabawassee is where we focused most

of our activities this year. It encompasses 11 river miles and we refer to it as Reaches P through MM. There's a pretty substantial sinuosity or meander change as you get into the Middle Tittabawassee River, and then the Lower Tittabawassee River, we also did a little bit of limited sampling down there to address some Priority 1 and Priority 2 properties in 5 reaches in the Lower Tittabawassee.

To go back about four months, the 2007 GeoMorph sampling and analysis plan was submitted on July 2nd, 2007. DEQ approved that 10 days later, and by the 19th of July, our field crews were collecting the first round of samples this year. Since then, we've completed the implementation of that original scope of work. I'm not going to go into all the particulars involved, a lot of over-bank, a lot of in-channel sampling locations, but the work that was described in that sampling and analysis plan has been completed. It incorporates 5.3 river miles in the UTR in terms of detailed in-channel sampling.

Middle Tittabawassee, 3 miles, that was limited based on bathymetry or the river bottom mapping that we had been able to complete this year before the water levels got too low and the instrumentation just frankly wouldn't work. We've also completed the

over-bank sampling for 11 river miles of the Middle and 5 select reaches in the Lower Tittabawassee River. We've also completed the -- some select erosion scar or eroding bank sampling in the Upper Tittabawassee River. On September 17th, we also supplied DEQ an updated version of the RIWP to address some of the comments that had been received in 2007.

To do a high level overview, I've got about 17 river miles to try and cover in less than 20 minutes, which is going to make it pretty difficult, but high level overview, we've collected more than 7,100 samples from more than 1,500 sampling locations. Again that's covers UTR, MTR, and LTR. Those samples have been analyzed by the rapid turnaround process, that is, the 16 13 RTP methodology that was approved last year for site specific implementation of this project. We've analyzed more than 6,300 samples to date for furans and dioxins. Those data have been available and we'll get a peek at what some of that information looks like tonight.

In addition to that, our field crews have logged more than 10,000 man hours actually since the end of July, so it's a big effort. This doesn't include the laboratory effort. This is just our field crews. In many respects, we're running seven days a week to try

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to take into account weather opportunities. So it's a major effort, and I think the number 10,000 hours in 90 days is kind of a testament to that.

To give you an idea of how we're going to present the information -- again this is not a site characterization review session. This is just to give you an idea of what it is that we're seeing and how that relates to the GeoMorphic site model that we saw for the Upper Tittabawassee. It really hasn't changed. What we've seen in the Upper Tittabawassee is what we are seeing in the Middle. That doesn't mean that it's absolutely one for one but the primary deposition areas are the same. They're the natural levies adjacent to the river, and as you move away from the floodplain, the concentrations decrease and the impacted zone at the surface also decreases.

I'm going to present the information in two ways. The first way is looking at surface TEQ which represents what the surface concentrations are at each sampling location. We do layer-based sampling which looks at the fluvial or the depositional characteristics, primarily looking A rises, D rises and C rises and so forth to be able to distinguish those and do layer-based sampling. So it's not a strict one foot or half a foot sampling because nature

doesn't lay sediments down in those types of manners. They lay it down in a manner that they want or that Mother Nature wants. So we'll have some charts that show what the surface TEQ representations look like and you'll see in many areas that surface concentrations are very low and there will be a spatial distribution of what that looks like.

In addition to that, we'll also be looking at max TEQ. When we refer to max TEQ, that is depth independent. So wherever the highest concentration is in the sediment core is where we will present that information. It gives you some idea of what the deposition history of that area or that sampling location looks like.

This chart is a depiction of what the typical river landscape looked like last year and also again we've confirmed for this year. You can see this is the area -- what we refer to as the in-channel area of the river, the Tittabawassee River. This area over here is the over-bank sampling area. The Tittabawassee River in terms of in-channel sediments, the typical profile for the in-channel sediments, are relatively low or clean, relatively clean sediments at the surface, followed by buried or elevated concentrations at depth. Typically, in the UTR,

elevated concentrations are in the range of 2 to 4 feet or maybe 2 to 6 feet below the surface.

The GeoMorphic features or the river landscape as you move away from the river classically has a natural levy or what we'll refer to as a levy complex that parallels the river, a low terrace, and then a historic natural levy. There's been some flowing changes through this river that has caused the river to shift and the end result is a shift in where the primary deposition areas are, moving from this historic to the natural levy. As you move away from the river, there's classically an intermediate, a low terrace. There's some GeoMorphic wetlands which are low depressional areas that hold water through most of the year, and then as you move away from the floodplain, intermediate and upper high terraces.

The general footprint for say the 100-year floodplain resides right along the upper high terrace or the scarp as it's naturally there. The general profile as we saw last year is not much different. We have some new feature development in the Middle Tittabawassee that we didn't see in the Upper. We have some ridge and soil complexes as you move into Imerman Park and we also have a little bit more deposition in the GeoMorphic wetlands. The deposition

characteristics for the over-bank areas as you move into the broader part of the river are more pronounced. So instead of 1 to 2 feet of impacted or elevated concentrations in the low areas, the GeoMorphic wetlands and lower surfaces, it's more like 3 to 4 feet is what we're seeing right now based on the data that we have for the Middle Tittabawassee River. So this is kind of a general snapshot of what we've seen in the Upper as well as what we've seen in the MTR.

To give you kind of a summary of the effort for the 2007 in-channel detailed sampling, it incorporated 5.3 river miles, Reaches E through O. 345 locations were sampled and more than 1,200 laboratory results were generated from those 345 locations. This picture up in the left-hand corner is the bathymetric survey that was completed and you can see the deposition and erosion areas. The deposition areas are generally in yellow or dark green. More erosion or pool areas are up here in the blue or darker green.

UTR in-channel distribution of TEQ. The solid bars are the TEQ representation and those are depicted here, here, here, here, and the concentration range moving from left to right is less than 100; 100 to 1,000; 1,000 to 5,000; 5,000 to 15,000; and greater

than 15,000. Again this is just looking at in-channel sediments. What this is telling us is that the surface -- the in-channel sediments in the surface are relatively clean. That isn't to say that every location and every sample is clean, but the general, assuming 345 locations and more than 1,200 samples, the surface sediments are relatively clean.

As you move into the max TEQ, which takes into account a concentration irrespective of depth, you can see that there are some elevated concentrations and the general trend begins to flatten out a little bit. We do have some elevated concentrations, or buried deposits, somewhat indicative of what we saw in Reach O and what we've seen in Reach L. These are historic deposits that have been there for quite sometime.

2007 Upper Tittabawassee erosion scar sampling. There was roughly 2,150 feet that were initially selected to do some representative sampling. 28 locations were sampled. Cross those on a transect base. I can go into the procedures on how we did that. We worked that initially with MDEQ, and from that, we've generated 28 laboratory results.

This next picture will show you what the distribution of those concentrations look like. The

erosion scar data, we have no erosion scar data that's in the less than 100. The majority of it, 50 percent of it, is in the 1,000 to 5,000 ppt range. We have over 25 percent that's equally distributed between 100 and 1,000 and 5,000 to 15,000. There was one location that we identified that exceeded one of the triggers of 10,000. We've initiated step-out sampling and those data are also included in this depiction.

2007 Middle Tittabawassee in-channel sampling. Again it was limited based on bathymetry or the detailed river bottom mapping that we had. There was 3 river miles, Reaches P through V. That basically takes us down to Freeland Festival Park. 145 sampling locations were initially collected. 976 samples for laboratory analysis are in the process. We have a fair amount of information that's still impending. So right now I don't have any data for the MTR. That's in process. So I'm not going to be able to show you what that looks like at this point. Again there is quite a few laboratory results. We've pretty much consumed the dioxin laboratory resource capacity in the last six months.

2007 Middle Tittabawassee River over-bank sampling. 11 river miles, Reaches P through M. 1,093 locations were sampled. More than 4,800 laboratory

test results were generated from those 1,000 samples. Just quickly, this graphic up here is an overlay of what we call GeoMorphic surfaces and the elevation model for this. This is an area that's very interesting. You can see this is an ancient or historic meander bend and there's some very interesting morphology that has been evolving with this area as the river consolidates from upstream and moves into this broader area downstream. I'm not going to go into a lot of GeoMorphologic characteristics of this area, but those are the things that we look at when we begin trying to understand where to locate sampling locations.

MTR over-bank sampling. This is again the distribution -- actually, this is total. This is surface and max TEQ. The solid is surface TEQ concentrations. The crosshatch is the max, taking into account where the concentrations are as a function of depth. The information here suggests that as you move into the Middle Tittabawassee River the over-bank is becoming a larger component in terms of flood-born deposition. The elevated concentrations or the max TEQ concentrations in the 5,000 to 15,000 again shift up slightly. We don't have a whole lot of highly elevated concentrations at the surface. That

isn't to say that we don't have any.

Generally, there are explanations for those, but the elevated concentrations are generally at depth, and there's a good explanation for that, again looking at where the river morphology, where the primary deposition zones have been occurring for the last 100 years. These areas in the 5,000 to 15,000 and greater than 15,000 are generally in the natural levies adjacent to the river or as you move slightly into the wetlands.

MTR residential property step-out sampling. I wanted to show this because there's been a fair amount of effort in trying to address step-out sampling on residential properties. This graphic up here shows in blue the boundary for the 100-year floodplain. The mapped GeoMorphic surfaces are underlaying in the transparency. This is the intermediate terrace, low terrace, GeoMorphic wetland. We've got a natural levy adjacent to the river down here. These are property boundaries and these are the residential properties up here.

These yellow concentrations are locations where the surface concentrations exceeded 1,000 ppt, and based on the step-out program, we needed to initiate step-out sampling to bound those, and you can see the

majority of the elevated concentrations are within the floodplain. They're within the 100-year floodplain line, and these are the residential properties up there. To give you some idea of the level of effort that was incorporated into this year's investigation program, it incorporated 297 samples that were over 1,000 ppt. Those are located on 42 parcels. 6 samples had concentrations greater than 10,000 ppt and those were on 5 parcels with other alternate land use designations, that being industrial, agricultural, but nonresidential designated property boundaries.

The IRA PCAP decision tree is being used to evaluate the need for interim actions. There's a multi-step process that we are going through. The delineation part of that is step one. After that, we go into step two to begin understanding what the exposure potential is of those areas.

2007 Lower Tittabawassee River over-bank sampling. There were 5 areas, Reaches NN, RR, SS, TT, and XX. 22 locations were sampled. We have three more that we need to do. We couldn't do those last week or this week because of firearm deer season. We now have property access to the MDNR property so we're going to go get the samples on the MDNR property beginning next week. As of right now, 135 sampling

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locations have been submitted for laboratory analysis and we should have the data back shortly. I don't have any graphics to show you on that because the data is still pending.

To give you some idea of where we've come in the last six months, the top several items are just items that we have had to go through since the GeoMorph process was approved for use on the Tittabawassee River. November 14th, we completed the formal sampling program for the 2007. In addition to that, we've incorporated a lot of additional step-out sampling to address IRA PCAP decisions, and right now we're waiting on a final group of laboratory information and couple of mop-up sampling locations that we have to collect before the -- hopefully, the weather cooperates this year.

The plan is to submit the site characterization report. Again this is not a site characterization review session. It's just to kind of give you a peek of what it is that we're seeing in terms of analytical information. The plan is to submit the site characterization report on March 1st, 2008. That's in the work plan, and that's consistent with the in-plant schedule as well. That's all I have.

CHUCK NELSON: Al has got some comments that

I think that he wants to make and then we'll have a little --

JOHN MUSSER: Al, do you want to wait until we do the Saginaw part of this, too?

AL TAYLOR: No. I think we can do it now. I think it will be more efficient to get it done. As usual, great presentations, great overview of what's been done. I just wanted to make a couple of comments. My name is Al Taylor. I'm a geologist with the corrective action program and I've been working with ATS for a while on this project. Couple of observations, one, we have the data that is available as of I think November 16th over on the side table over here and the surficial data is plotted. So if anyone wants to look and see that information, that is available, and it's a great way to get an idea of how much work has been accomplished over the last year.

It will also show kind of the hanging problems that we have with the Middle Tittabawassee River and which will continue into the Lower Tittabawassee River. There are a number of black dots over on that map of sample locations that have not been captured yet because of property access issues, and so there is quite a bit of follow up work that will probably need to be conducted next year to capture those unsampled

locations and to get property access to get that information.

Just real briefly, I thought the graphic that Peter showed, this one right here, I thought this was a great graphic which illustrates one of probably the most difficult problems that we're going to have to deal with on the Tittabawassee River which are these natural levy deposits, and one thing that this -- I think it's just the way the river is shown here, but this red area, this really highly contaminated area, is actually typically located up further and is typically above the water level and would be eroding into the river, and that's one of the -- anyone who's talked to me about this issue knows that eroding banks are a big issue. That's shown very well in the graphic, showing the erosion scar samples, how those were consistently quite high, and it's probably going to be one of the more significant problems that Dow is going to be facing in the eventual remediation of the river.

With respect to the discussion of the in-channel concentrations, I'm still going to be put in the plug that, while surface concentrations in terms of frequency are typically low, the DEQ still views this as a very dynamic river system, and we believe that

those sediment concentrations, even if they're buried by a foot or so of sediment, we believe that those are available for re-exposure at the surface under certain conditions, and that's not a long-term stable situation in our view. There are some areas where very deeply deposited sediments may be more stable but right now in terms of overall stability the jury is still out with respect to DEQ. Right now if it's in-channel we think that it's in play in terms of probably needing to be addressed in terms of overall corrective action.

Peter described the MTR, Middle Tittabawassee River, residential property step-out sampling. We think that is very important work and I think I'm going to try to get back over to that graphic if I can. The point here that we think is quite important and we think that step-out sampling has actually been going fairly well. We are going to be looking for something called exposure unit sampling after we get this data in and have had a chance to evaluate it within these individual geomorphic units and to see how this relates to the adjacent residential properties.

But the other point I want to make sure that is clear to people is these are residential properties up

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here. The individual transects represent more than just that property. You also have to recognize that they represent the adjacent properties as well. So while there are samples on 42 properties with greater than 1,000, that could potentially mean a larger area with greater than 1,000 that we have to do some additional investigation on.

And the last thing I had to -- and actually, it's a question. In terms of the schedule for finishing the characterization of the Tittabawassee River and the in-channel sampling and the Lower Tittabawassee River, is that -- can you just kind of go over that real quick, the schedule for completing the characterization of the in-channel, Middle, and Lower, and the over-bank for what is not done?

PETER SIMON: Yes, absolutely. The plan as of right now is to collect, as soon as the water levels come up in the Tittabawassee River, collect the bathymetry from Reaches V down through YY such that we can develop a sampling plan and detailed in-channel characterization next year. We have the crews on standby. So as soon as the river starts to come up, the crews will be out there and we'll get the bathymetry.

The plan is to collect in-channel samples for the

remainder of the river next year and the plan is also to finish the over-bank sampling in the LTR next year as well, and we anticipate there's probably going to be some additional mop-up sampling possibly in the MTR, possibly in the UTR as well. So the overall site characterization should be complete by the end of 2008.

AL TAYLOR: Perfect. Thanks.

CHUCK NELSON: Go ahead very quickly here.

VICTOR MAGAR: I'm Victor Magar. I'm with Environ. I'm a Consultant with Dow and an Environmental Engineer. I was here at the last public meeting and I talked about the sediment trap in the Sixth Street Turning Basin. I'm going to talk about the Saginaw River investigation and what I am interested in talking about, what I'd like to present you with, is just a very quick overview of what we are doing in the Saginaw River, why we're out there. I think everybody is aware of the very high concentration that we had seen recently and we're responding to that and I'm going to end with that concentration which we saw was measured at 1.6 part per million. Then Todd Konechne will lead off and describe what the removal action will be to address that particular sample hit.

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So I'm going to go over the current conditions. We submitted a current conditions report to MDEQ and EPA and that described our current understanding of the environment in the Saginaw River. That helped us to establish project goals and sampling criteria for the river and then I'll describe what we are doing to sample the river and some of our very initial findings really which revolve around Wickes Park. We just released some data to MDEQ today. I think at the end of this, because of the speed at which I'm going to go through this talking about all this information to get time for my colleague, I'm going to stand over there by some of the posters where I can talk a little bit more about the data and would be happy to entertain more questions after this portion up here.

So one of the things I'd like to emphasize is how different this river is than the Tittabawassee River and I think that's important for all the people here because we're so familiar now with the Tittabawassee River which has a fair amount of energy. It's very responsive to flow conditions, to rain events, to snowfall, and we call it flashy river which has some energy to be able to move sediment through the system. The Saginaw River is a much slower river. It has a slope of about 1 foot every 2 miles in elevation

change which is very slow. It's also a very industrialized river. There's been a lot of activity. We've even collected sampling that's occurred on this river system, most notably PCB work, PCB sampling, and even some remediation associated with PCB in the past, and we've had industrialization going back to logging in the 1800's, agricultural use, coal mine production, and then iron refinery that led to our car industries and so on.

So it's not a natural river like we know of the Tittabawassee River. We think of that as a much more natural system and we see things like these hard banks that are typical of the river. We also see some naturalized areas along the river and we did some sampling there as well, and these natural areas will very commonly be a boundary for agriculture. So if you were able to step over some of these wooded areas, you'll probably find a lot of agriculture in this area. Despite a lot of the industrialization, there's been some improvements. Probably the biggest improvement is a reduced hypoxia, that is, oxygen levels are increasing, and that is really a testament to all the waste water treatment and even some agriculture run-off and control that we've achieved in the middle last century.

And so where does that bring us with respect to the concentrations of furans and dioxins and I show a map here coming from our current conditions report describing the distribution of TEQs based on historical data that was collected by mostly MDEQ and the Army Corps of Engineers, somewhat EPA and other agencies, and what we see here, and if you can just look at the high level of the color distribution that we see, we see fairly dark colors here at the Upper Saginaw River and lighter cooler shades in the Lower Saginaw River, the lower two-thirds of the river. The cutoff being kind of around the Zilwaukee area, and these darker colors represent concentrations that are some below -- some of the concentrations are low, below 100 ppt, but some of the darker colors will represent concentrations above 1,000, even above 10,000, and we saw that in some of our sediment trap reports, and I think those are concentration ranges that we've all addressed even before this portion of the river. Much lower, the blues are less than 100 part per trillion. The magentas, if you can see that, are less than 200 part per trillion, very low concentrations, and the reason that we think that what we see happening here is that much of the energy that is coming in from the Tittabawassee River, from the

confluence area that occurs right here, the confluence of the Tittabawassee and the Shiawassee Rivers, is dissipated in the upper six miles and we get this drop-out of most of the sediment and then much finer material that has lower concentrations is traveling downstream, and then that brings us to the sediment trap work that we're digging up around the Sixth Street Turning Basin. So our hope is that with that sediment trap we can begin to capture some of that material so it's not moving further downstream.

With that knowledge, that understanding led to our current investigation, and the primary goal very simple was to make best use of this current year 2007. That we could try and collect data to fill in some gaps to increase our knowledge of what's happening in the sediment and the floodplain areas and even out to the Bay and some of the beach areas of the Saginaw River and Saginaw Bay, and so I think, as you see the distribution of samples and sample locations, you'll see how we distributed those locations throughout the river and into the Bay.

We did submit a statement of work that went to MDEQ on the 13th of July. We received comments on that on August 30th, and meanwhile, we were also working on an investigation work plan. I think in a

lot of press reports we saw that we are working under an unapproved work plan, and the reason for that comes back to my previous slide was really it reflects our incentive to try and get some information so we can inform ourselves for further investigation as we move on to next year. We really do see this as a phased approach. This isn't an endpoint but more an opportunity to gain knowledge and to build a stronger basis, stronger foundation for next year's sampling.

We looked at bathymetry and topography. I think you've heard a number of times from here the use of bathymetry and topography and this gives us the land and bottom elevations of the sediments so we can then model the river flows and hydrodynamics for this system. We've collected samples. These stars, if you can see them, indicate the different sample clusters. This is the cluster where we had a very high concentration, cluster number one, very close to the confluence area, two, three, four, and we keep going down to nine different clusters, each cluster having about 11 sediment cores in the river, and you'll see an example of that in these slides of what a cluster looks like, and we also looked at turning basins. So our goal when we placed these different clusters and looked at these sample locations was to consider

depositional areas where there might be accumulation of sediment and the highest probability you might say of seeing TEQs or seeing dioxins and furans.

We also went out to the Bay and this shows the grid that we used for the Bay. We had 28 sediment cores that we collected from the Bay and we collected samples in various gridded patterns on five different beaches along the Bay. Lastly, we collected samples from six different soil locations or what we might call floodplain locations but this floodplain mind you is much different than the Tittabawassee floodplain that we're all familiar with. There certainly is a floodplain and there is flooding that occurs around here.

And so when we located these, we tried to identify areas that would be within the floodplain and then we created a step-out sampling approach. You can see these different grids of three transects in each of the floodplain areas trying to look at what might be the near-shore distribution of furans and dioxins where concentrations presumably would be highest if we are to see anything in those areas, and again you see with the green boxes here a pretty good distribution of variants. There's a lot of gaps here. Most of those gaps just reflect an inability to find a

naturalized area between two locations and in some cases an inability to get permission to go on to properties.

So at the end, we collected almost 1,000 samples over the past two months, a fairly aggressive schedule. We also did the bathymetry and topography. We also completed hydrologic surveys to measure the water flows and to be able to use that and incorporate that information into a model. We conducted riverbank surveys where we surveyed the river to look at the stability, erosion potential, different conditions on the Saginaw River, and even carried that to the Tittabawassee River. That will also support the Tittabawassee River program, and we did sediment benthic habitat surveys and we were very interested in what the biological activity is and we did that with a camera that photographs the benthos.

And that brings us just to the Wickes Park area. This is what a transect or a cluster looks like. It's sort of a T-shaped cluster that gives us a transect in both directions of the river, and we have the data here. The data is posted over there. The sample that is of interest is this sample location right here. We bounded it and I can show you and I can talk more completely about how we bounded those concentrations.

This red boundary shows where the excavation work or the removal action will occur, and I think Todd can pick it up here since I'm being kicked off the stage. Thank you for your time.

TODD KONECHNE: My name is Todd Konechne. I'm a Project Leader at Dow Chemical working on the river remediation projects. I'm going to cover what are the actual activities that we're pursuing from a response action for the area that's been identified along Wickes Park this evening. This picture here just represents the same removal area that Victor just showed you in relation to Wickes Park. This is the old boat launch that has within the last couple of years been closed down and no longer in use to give you a reference, a little bit closer reference.

This is a very targeted emergency removal that we're going to be performing in the next few weeks, hopefully before the heavy ice flows get on the river. It's a hydraulic sediment removal technology that we're going to be implementing. It will consist of a dewatering operation and a filtration operation on the shore and the sediments will then be coming off that dewatering operation, will be loaded into trucks, and transported directly to the Salzburg Landfill at Dow Chemical in Midland. The on-shore activities which

will consist of a dewatering and filtration and truck loading will be taking place at the old boat launch in Wickes Park. We received the approval by the City of Saginaw to use that location for this activity.

This is just a couple of photos of the old boat launch. You can see in that picture the removal area is just up river about 300 feet and about in the center of the river. There's another photo of that. The hydraulic sediment removal is going to utilize a submersible pumping system, just like a vacuum hose per say. It's going to be operated by underwater divers so there will be -- it's not going to be operated by equipment. There will be actually divers down working with the hose, moving along the bottom of the river, and removing the sediment as we progress through the removal area. Their equipment and their staff will be housed and working off a 40 by 50 foot barge that will be directly -- not quite directly above the diver but very close to the diver. It's about a 60 foot hose between the barge and the diver, and they will be set up in the river, anchored in with several cables, giving them the ability to easily maneuver and basically follow that diver as he progresses. We anticipate a removal capacity of about 80 to 120 yards per day of sediment.

This is a picture that was taken just two days ago right after the barges were set in the river and they're starting to get it equipped. As of today, this barge is fully equipped with the diving equipment, housing all of their equipment that they need to have to have a safe dive. The dewatering system which will be located at the old boat launch in Wickes Park. Like I said, we received access agreement from the City of Saginaw. We wanted to show our appreciation. Their willingness to give us this agreement definitely is going to be key for us to move quickly and take action on this particular removal location.

The dewatering system utilizes two in-series systems. It's called a total clean system. The equipment has a number of shaker screeners, hydrocyclones, a clarifying unit, and additional shaker screeners or fine screens to remove the last bit of water before that sediment then is delivered to a conveyer system that will deliver the solids with handling equipment that will be used to load trucks. The material will not be inventoried on site. As the material is generated, dewatered essentially, within minutes, it will be delivered into a truck. When the truck is full, the truck will be tarped and sent on

its way to the landfill and another truck put in its place.

The filtration system which is the next stage of the water cleanup is also going to be located at the boat launch. This is a three tier system for redundancy. It consists of a sand filtration system. The sand filtration system will take the overflow water off the dewatering operation. It will be operating on an automatic mode where the sand filters will be continuously back-flushing back to the beginning of the dewatering process, so it will be kind of a self-cleaning filtration system. That again is kind of a course filtration.

Next in line will be a series of bag filters. These filters are designed such that we will be able to get down to .5 to 1 micron filtration to get our TSS levels down to the point that we need to for discharge back into the river. As a backup if we have problems with that system getting our TSS levels down low enough, we're going to have in-line ready to go a backup cartridge filtration system that also let's us put in a last level of defense if we need to for filtration with some cartridge filters.

This again is a picture that I think this was taken yesterday morning showing the boat launch area,

some of the equipment that is arriving. You see a Frac tank here. This is part of the filtration equipment. Not all the equipment is quite there yet. More of it arrived today. It should all be on site tomorrow by noon. You can see that one of the first things we did at the boat launch is we tore up the old pavement that was there. It was very broken up and cracked and we laid down a new asphalt surface so we had a good working, contained type surface to be doing the dewatering and filtration on.

Schedule of events. Dow received the information of the preliminary results on the 8th of November. This was invalidated D/F data, the numbers that we've all been hearing about, the 1.6 parts per million. On the 9th, this information was communicated to the EPA and the DEQ. On the 10th is when I basically got involved. We began doing site evaluations, looking at different removal technologies and contractors. We basically have been talking to contractors around the entire country, as well as local contractors, to get mobilized for this job and identify the types of technology that we think we can do at this stage very quickly and effectively.

On the 15th, Dow and EPA executed the administrative order and the signatures were done at

that time so that was finalized. At the City Council meeting on the 19th, we received approval to have and were granted the access agreement by the City of Saginaw. The very next day on Tuesday we began the site preparation work, the removal of the asphalt, and a new layer placed down for our working surface. All week long equipment has been rolling in on the project. We've got the site secured with a fence line. We've got lights on the area so we can work into the dark of the evening. We have around-the-clock security out there just to make sure we don't have any issues, and we will continue that mode until the project is over.

We anticipate if everything goes well -- like I said, the last few pieces of dewatering equipment is scheduled to arrive tomorrow morning. By the end of the day tomorrow, we're hoping that we have the system ready to operate come Friday. The 15th of December is our target for sediment removal and confirmation and new baseline sampling to be completed, and if we -- you know, once we meet that and meet that deadline, we'll begin the demobilization and site restoration shortly after, and this is just another visual of that area. This is what you would see today basically if you happen to drive by. That's it for my discussion.

Am I going to go right into J/K and O?

JOHN MUSSER: Yes.

TODD KONECHNE: I'm going to give you a real quick overview of the activities that were performed earlier this summer and this fall at the Reaches called J/K and O on the Tittabawassee River and then I'll give you kind of a rundown of where that stands today. Both of those projects have been completed. This is an aerial photo of the property at J/K at that site. This is close to the completion of the restoration activity. This area here is the area we call just upstream what we call the boat launch. This is all Dow property in here.

Prior to starting this -- and unfortunately, we don't have an aerial showing before the project started. This tree line that you see in here pretty much continued down to the rivers edge and through this area and connected back in here. This project consisted of removing and reshaping the bank area in here due to contamination in that bank and erosional concerns with the bank, reshaping the shoreline. There was contamination up here in the upper terrace and the solution for that area was to place a 2 foot cap of clean soil to reestablish vegetation. There was a very heavily wooded wetland in here that also

had some contamination. We're putting in or installing control measures, basically putting in an 8 foot fence around that area to keep people away and keep things out to control potential exposure.

These field activities started in early August. It was a couple of weeks and we had the site cleared, cleaned. We had our erosion controls in place, and shortly after that, we started the massive soil excavation and haul to the Dow Salzburg Landfill. Once the contaminated soil was removed, the next step was to place the 2 foot cap in the upper terrace area, and after that, the entire area was covered with 6 inches of clean soil that was brought into the site, and then the restoration work, the revegetation and trees.

As part of the project, to obviously remove that natural bank, we had to remove about 300 mature trees along the bank. At the end of the project, we had removed over 32,000 cubic yards of soil that went to the Dow Salzburg Landfill. We reconstructed about 1,800 feet of shoreline as you see in the photo, and along with the wetland vegetation and upland vegetation that was replanted, we planted 400 new trees in the area.

These are just a couple of photos showing you the

excavation activity and the magnitude of the excavation. Prior to this project, there was a fairly steep bank out here at the waters edge, quite high, probably came up to 10 feet or so, heavily wooded, and then it flattened off and actually tapered back to this natural area here. So there was a huge amount of soil removed. Another excavation shot.

This is when most of the excavation was done prior to the clean top soil being placed down, an aerial photo, and similar to the very first photo, this was just about the end of the restoration, and then this is a photo showing what it looked like a few weeks ago and you can see the grass and vegetation starting to get established. That's it for J/K.

I'm going to go into Reach O. This Reach O was done basically at the same time only with a different cast and crew of characters. There was a number of folks that were shared back and forth. This was a lot more involved than J/K and definitely a lot more challenging. This represents what the site pretty much looks like today. We don't have a pre-Reach O remediation photo. Everything you can see in this area is Dow property. Saginaw Road is up here. The actual removal activity in the river took place out here. There was four removal areas out there where we

sheet piled around the removal area. We dewatered the area to where we could implement a dry excavation. A road was constructed through the woods here. We tried to leave as much of the woods along the riverbank and disturb as little of the riverbank as we could. This area here is kind of the staging area. The sediment was staged out here where it was then loaded into road trucks that could haul it to the Salzburg Landfill and this is a gravel road that was constructed to accommodate the project as well.

This project started on the 13th of August. The site prep and mobilization, basically constructing the dewatering facility, the roads to access the site, as well as the roads and the ramps down to access the river was completed on the 28th of August. There was four different areas, so we would start one area at a time. There was usually two areas being constructed in different phases, two to three at any one time. The sheet piling activity was very intensive sheet piling work that took place in the river. The first removal area was completed on the 4th of September and the last one was completed on the 24th.

Following behind that sequence then in the same order was the actual sediment removal. You can see that followed it just a few days after the sheet

piling went in. The prep, the sheet pile, getting the area ready to excavate was a very big part of the job. Once we were at that point, the excavation went quite quickly. The confirmation sampling that we did in each of the areas then shortly followed as well and these are the dates by which we had our data back and we were ready to basically start removing the sheet piling in that particular unit and letting it reflood.

The final step-away from the job, the restoration, where we had everything demobilized and everything removed that we were going to remove, was completed by the 11th of November. This is a photo showing one of the removal areas. This was the first removal area in the river, so you can see a very extensive sheet pile perimeter here. We in this particular area actually extended out beyond halfway through the river. It was very concerning to us that any type of rain event could get this river flashing and you run the risk of flooding this area after we had already gone through to get it dewatered and get it prepped for removal. You can see the excavator in there actually working on the removal activity in this photo as well.

This is another photo looking down into the removal cell. You can see the sheet pile wall out

here and obviously the excavation equipment and truck and what the area looked like after we dewatered it and was working on the excavation. All together, this project constructed about 5,000 feet of temporary roads and ramps on the Dow property to access both the dewatering and material storage area as well as the actual removal areas. We installed approximately 1,900 linear feet of sheet pile out into the river for all of the units combined and dewatered those areas and removed approximately 22,000 cubic yards of river sediment that was also transported to the Dow Salzburg Landfill.

As part of the restoration work here in this particular case, we only disturbed what we had to, to get our equipment in and out of the river, so it was not as extensive as the J/K area but there was still quite a bit of change to that landscape and we ended up in our restoration planting about 200 trees and brush. This is a photo of the riverbank at one of the removal areas where this had to be cut away and we had a ramp built down to get into the river. This is what it looked like after we performed our restoration area or restoration. We reshaped it. We brought in some logs to get it in place and planted quite a bit of shrubs in there to try and get a root vegetation

growth to stabilize that riverbank, and this is what it looks like as of a couple weeks ago as well. You can see our three areas where we had ramps into the river where the road was and the staging area out here. That's it.

STEVE LUCAS: My name is Steve Lucas. I'm the Remediation Leader for Dow and the Midland plant site, and Reach D falls under my general charge. As a reminder, Reach D is immediately adjacent to the Dow plant site in Midland just above the Dow Dam. Our general removal plan was to install a steel wall similar to what you saw Todd did down at Reach O and to contain the deposits and removing the deposits by hydraulic dredging, conducting sampling when we're done. Solids and water being separated by the use of Geotubes. The water in this case is treated in our on-site waste water treatment plant and the solids are being disposed of in the Dow Salzburg Landfill.

The sediments we're removing here are very different than the sediments found in the other removal areas or frankly anywhere else on the river. In addition to the furans, these sediments have significant levels of various chlorinated benzenes, polynuclear aromatic hydrocarbons and metals. So other substances are driving concerns here. To date,

we've removed about 17,000 yards of sediment, rock and debris out of Reach D and we've treated just over 57 million gallons of water from hydraulic dredging.

Project milestones to date. We started construction on our dewatering facility last May. The facility was finished right prior to Labor Day weekend and we started dredging just after Labor Day on 9/4. The entire containment wall was finished late October. So we were constructing containment wall downriver while we were dredging upriver and kind of overlapping activities.

This is a picture of Reach D. The red line indicates the general outline of the containment wall we've constructed. The green areas are areas that we've completed the removal per the original work plan and have conducted sampling, and the area -- the south end there is the area we're currently working on and getting close to finished.

Timeline from here, we expect to finish sediment removal and post-removal sampling in all areas by December 15th which is our commitment within the order we have. All sediment will be landfilled next year. We're going to do some of this over the winter, excavate our Geotubes out, and we'll fully restore the industrial area next June -- by next June.

That's an aerial photo of Reach D as of a few weeks ago so you can get a general sense of the sheet pile there adjacent to the plant site. The Dow Dam is visible right in front of Reach D. That's a picture of the dredge in action in the southern most containment cell of Reach D, and that's our Geotube lay down area some weeks ago where we are dewatering the sediment. That's it.

CHUCK NELSON: Thank you. The presentation that was made that wasn't directly on the agenda as a way to segue into the Wickes Park area, CERCLA actions, we are a bit behind schedule. I apologize for that. I would like to move right into EPA comments. I know we're a moment or two behind where you folks were supposed to be but it's your opportunity here to provide those comments. I would also note that if folks from Dow, the DEQ, or the EPA have handouts they would be willing to give back to Cheryl. We have so many folks in attendance tonight. We do not have enough handouts. So if any of you could get your Agency folks or Dow folks, get your handouts back to Cheryl, she can make sure folks in the audience have a handout.

BRIAN SCHLEIGER: Good evening, ladies and gentlemen. My name is Brian Schleiger. I'm the

On-Scene Coordinator with the U.S. EPA. In conjunction with Jim Augustyn and myself, we have been conducting oversight of the interim response actions that have been taking place at Reaches D, J/K, and O. I'm not going to reiterate the same presentations that we just saw, but I do want to mention, as of November 15th, 2007, EPA and Dow has signed an agreement, a consent order, to begin emergency cleanup on a previously unknown hot spot in the Saginaw River. This area is located near the Wickes Park. As with the other Reaches, we will continue to do oversight of that area.

RALPH DOLLHOPH: Again my name is Ralph Dollhoph. I'm the Associate Director for Superfund in EPA Region 5. I would like to augment Brian's comments and to provide you with some additional information regarding the cleanups at Reaches D as well as at Wickes Park that was presented to you by the Dow Project Managers. At Wickes Park, while we commend Dow for the progress that it is making towards rapidly conducting the removal actions pursuant to the administrative order on consent that they've negotiated with EPA just over a week or so ago, we also want to point out that this work is being conducted under the combined oversight of EPA and DEQ

and in conjunction with EPA's On-Scene Coordinators and DEQ's Project Managers.

And I want to remind you that this work is being conducted under a work plan that is required by this administrative order on consent. This work plan has yet to be approved. It is in the process of being approved or reviewed by EPA and we expect that review process to proceed forthwith. We want Dow in the river getting this stuff out as soon as it possibly can happen but we also want to make sure that the manner in which that is done is done appropriately in accordance with all State and Federal laws. So that's something that we need to be aware of and we'll continue to keep you posted on how that's going.

With respect to Reach D, the project that Mr. Lucas just described to you, you should know that the performance base removal action that EPA and Dow agreed to perform at this location under the administrative order on consent back in July, Dow is required to remove a certain amount of material, to perform certain work, and as Steve said, they are nearing completion of that work. They appear to be on schedule, but there are some remaining issues that may cause there to be a need for additional work, and EPA and DEQ are having discussions with Dow about that

right now, so there's more that remain. There's other information that you need to be aware of that you need to continue to monitor as we move forward on these projects.

So again not to be redundant with respect to the Dow briefings on these projects, I want to remind you that these projects have been completed pursuant to EPA administrative orders on consent at all four of these locations. The first two are areas that were being developed by DEQ and Dow under the corrective action process. Those are the Reach J/K and the Reach D projects. EPA saw fit this summer to encourage Dow to do additional work at Reach O and subsequently at the Wickes Park location just a couple of weeks ago.

EPA intends to continue to exercise its Superfund authority to help Dow and DEQ maintain an accelerated pace of cleanup and response at this site. One of the ways that that might happen is under a scenario which EPA and Dow and DEQ are currently involved in negotiating. I think most of you are aware that back in October EPA, Dow and DEQ entered into a negotiation period -- a 60-day negotiation period which expires on December 10th -- to do several things, to perform a remedial investigation feasibility study, to perform additional removal actions, and to perform remedial

design. Those are the big three elements of this process that is being negotiated.

And so we thought it would be a good idea to provide you tonight with some information regarding the Superfund process. I've asked Wendy Carney who is our Remedial Branch Chief, our Remedial Program Manager for Region 5 to spend just a couple of minutes providing you with that sort of overview of the Superfund process so that you can better understand it, if it is of interest to you, and then, of course, we will remain here later to respond to any questions that you may have about it. Wendy.

WENDY CARNEY: As Ralph indicated, my name is Wendy Carney. I'm a Program Manager in the Superfund program. What I want to do for you is give you a very quick overview of what the Superfund program is all about. There are two major components to the Superfund program. There is a remedial program and a removal program. I'll talk a little bit about each of those programs and how those programs operate maybe a little bit differently than each other. The third thing I want to try to cover today is some fundamental operating principles that the Superfund program works with in both of their programs and the last thing I want to try and cover is a little bit of

discussion of how Superfund sees itself working at this site in conjunction with the river program to move the site forward toward an overall cleanup program.

The Superfund remedial process is the part of the Superfund program that looks to do sort of the more larger scale, comprehensive cleanup work at sites. The program has four major components. The first is the remedial investigation and feasibility study stage of the process. This is the part of the process where we look to define the nature and extent of contamination. We look at human health and ecological risk issues that might exist at a site, as well as work on developing a variety of cleanup options. This is similar to the part of the process that the RCRA program is in right now. This is one of the areas where we would start. We're well aware that there is a lot of data that has been collected on the sites, and for our purposes, we're looking to sort of build upon that and move forward essentially towards a cleanup, towards a cleanup decision.

The second part of our process is the selection of remedy. In the remedial program, Superfund documents its decisions in what's called a record of decision. That's a formal document where the Agency

independently makes a decision of what a cleanup -- what cleanup plan should be implemented at a particular site. After a decision is made on remedy, we move toward cleanup. There's two stages to that. The first is a remedial design process. That's where, you know, engineering plans and all the specifications get put together that drive essentially how the work in the field will get accomplished. The remedial action part of the process is the physical work in the field doing the cleanup.

The last piece in the Superfund remedial process is what we would call close out. A lot of sites require ongoing stewardship after cleanup processes have been completed at a site. It's in this part of the process where the Superfund program does a couple of things. The first is, you know, insuring that appropriate plans are in place to insure that that stewardship takes place at the site, documents all the cleanup work that's out there, and the last piece is what's called a five-year review component. Superfund continues to look at sites after the remediations have been completed on a five-year cycle to insure that those remedies remain protective over the long-term.

The other key program within Superfund is the removal program. The removal program is different

from the remedial program within Superfund. Its primary purpose is to address situations that present more immediate risks or to address, you know, where there might be releases of contaminated materials occurring, such as those materials that might have very high concentrations of contaminants. The process is very streamlined. It moves very quickly. This is the part of the process or the program basically within Superfund which was used to move the cleanups along in Wickes Park, J/K, O, and Reach D.

Superfund is a program that operates both the remedial program and the removal program, has certain fundamental operating principles that we work with. The first of those is public participation. It is integral to both our removal programs and our remedial programs. The public participation part of each program operates a little differently, but the idea is that we want to engage with the public. We want to involve the public, insure the public is aware of what we're doing, and allow them opportunities to give us feedback essentially on the work that we're performing out at the site.

The second principle that we operate with is an enforcement of first principle and what this means is that our key and primary goal within Superfund is to

get the parties that we believe are responsible for the problems that need to be addressed to take on that responsibility and do the work that's needed out at sites. The last piece would be this emphasis on taking action sooner as opposed to later. That's key for us. We use both our removal and our remedial authorities to insure that early actions happen at sites as quickly as they can and as soon as they can essentially when we start looking at sites in our program.

Superfund and RCRA, essentially, we don't see that the two programs are necessarily working at odds with each other at this particular site. The Superfund removal and remedial programs are programs that we think can help augment the efforts of the State led RCRA process. The site is a very large site. There's multiple areas. It's not only the river systems that need to be addressed out here but you have ongoing work both at the plant itself as well as, you know, ongoing evaluation within the City of Midland. There are ways that both of the programs can work together to essentially accomplish more sooner out here as opposed to later.

The Superfund program also has some unique skills and capabilities. There are a large number of sites,

big river, large river systems nationally that are being addressed with the Superfund program. We have a fair amount of experience both here in Region 5 as well as nationally. Region 5, the Superfund program is working on such sites as the Fox River. We have done work up on the Pine River. We're working on the Kalamazoo River, the Cheboygan River and Harbor up in Wisconsin. So there's a lot of just basic experience that we think we can bring to help sort of move the process along on this particular site.

The last thing is that we think we have a lot of flexibility. I think that's, you know, some of what you've seen in terms of bringing our removal programs and authorities to the site to move some, you know, cleanup along. Working quickly with Dow to sort of get the Wickes Park action underway is sort of just a demonstration I think of how our program can essentially, you know, move the cleanup at a much quicker pace. With that, I'd like to give it back to Ralph.

RALPH DOLLHOPH: Thank you, Wendy. I'll close EPA's remarks by transitioning from something that Wendy said. EPA believes that the RCRA and CERCLA or Superfund processes are compatible. That they can augment each other. EPA believes that it can

work cooperatively and successfully with DEQ and the administration of both programs to this project, to this site, and as Wendy said, community involvement is an important component of our Superfund process. We recognize that we are guests here this evening. This is not our meeting. This is not an EPA meeting. This is a DEQ, Dow meeting.

As EPA's involvement in this process or in this site continuous, we will be looking for ways to provide different types of settings, different formats, different opportunities to insure that community involvement is inclusive, it is comprehensive, and that we are addressing the needs of the community. I would encourage you this evening, particularly in the session after the formal meeting, to meet with our Community Involvement Coordinators. Again, they are Briana Bill and Rafael Gonzalez. Would you, please, hold your hands up again for any latecomers. If you have thoughts about community involvement process, I would encourage you to talk with these two people so that your thoughts can be considered. With that, I won't take up anymore of your time. We appreciate the opportunity to comment and we will stick around for questions. Thank you.

CHUCK NELSON: Okay. Folks from MSU, we

need to get caught up. We have had copious amounts of information but we need to keep it moving.

DR. MATTHEW ZWIERNIK: Hopefully, we'll have some interesting pictures here so we'll keep people interested. My name is Matthew Zwiernik. I'm with Michigan State University. I'm going to talk to you today about some work we're doing on the river as far as wildlife health and ecological studies. This is a five-year project. We're on our fourth year, so I'm going to present you data up to today's date.

First of all, I'd like to thank our contributing landowners. We have over 60 contributing landowners, and if those of you are here, yes, I do have something other than camo pants and a dirty Michigan State T-shirt. Also I would like to thank the local resources. We used the Chippewa Nature Center. We also used the Shiawassee National Wildlife Refuge, which are great resources, Tittabawassee Township Park and Saginaw Parks, also great local resources, and of course, Dow Chemical Company who provided us with the funds to do this with an unrestricted grant to Michigan State University.

Like I said, this is a large project. We have over 20,000 hours in the field, visiting scientists from all over the world, five graduate students, seven

technicians, some 20 odd undergrad researchers, and they do most of work. I just get to be up here and talk about it. So the objectives in my presentation today are going to be a description of the MSU wildlife studies. I'm going to try to tell you what we know so far and what we have left to do.

The overall study objective for our work on the river is to provide risk managers and, of course, the public as being input to risk managers, with scientifically based, site specific risk of harm evaluation for valued ecological entities, kind of big words. I'm going to give you a quick summary of what I'm going to say tonight and then I'll try to convince you that what I'm saying is actually true.

So the first part I'm going to make is that on the river the contaminants to the wildlife anyway are entering the food web and that the wildlife are being exposed to primarily the two furan congeners of concern, 2,3,7,8 and 2,3,4,7,8 dibenzofuran, and we're doing a lot of different -- we're doing a multiple line of evidence approach and our lines of evidence are lining up so tissue and dietary based exposure assessments agree. We're also taking measures of individual and population health. These are very, very important because this is actually what we want

to look at, so we're directly measuring individual and population health. Preliminary data would suggest that there are no differences between upstream and downstream individual health, population health, or abundance for any of the animals that we've studied along the river.

And finally, the toxicological profile of the contaminant mixture, which is primarily those two furan congeners, we have very little data pertaining to the toxicological potency of those furan congeners to wildlife species. So that's kind of an uncertainty that we have to deal with and we're working on that presently.

So a quick primer on how this works. Dose response, cause and effect, and ecological risk. We're going to use a multiple line of evidence approach. The first line of evidence is going to be a dietary exposure assessment. The second line of evidence is going to be a tissue based exposure assessment, and I'll go over what both of those are. Essentially, we're going to do what we call an exposure profile. This would be similar to if we talked to everybody in this room and tried to get a handle on what their exposure to say cigarette smoke was. You would have a few people that have no

exposure. Some would get secondhand smoke. Some would get more secondhand smoke. Some would smoke cigarettes up to packs a day at the far end.

What you then do would be overlay a toxicity dose response curve essentially and where those two cross, so where your exposure or your toxicity lines cross, is where you possibly see risk to population health or adverse effects. Now the first two we can directly measure. We can measure exposure in the fields and we can measure population effects, and presently, like I said, we are trying to work on the toxicological dose response curves. So ultimately, we're going to look at individual and population health measures, to understand population health and sustainability, and that's population of wildlife species that we're looking at.

So we have -- we can't look at every animal out in the field, so we have to select representative animals to look at. Each animal that we select has some criteria for the reason we select them. We like to select things that are year-round residents, if possible, that are very sensitive to the contaminants. So we have the Canary in the coal mine where we have high exposure and great sensitivity, so we're going to hopefully find what an animal -- if there's something

going wrong, we'll find it with that Canary in the coal mine kind of scenario.

So we're looking at songbirds, four different species of songbirds. Tree Swallow which is kind of aquatic based. We're also looking at the American Robin, the House Wren, and the Blue Bird, which are altruistic based food web. We're looking at fish eating birds because these contaminants are felt to bioaccumulate. We're looking at raptors, migratory waterfowl, and mink, which is kind of our Canary in the coal mine for mammals.

So like I said, we're going to use a multiple line of evidence approach. So the first thing we do is go out and try to identify the site specific dietary composition of each our animals and we do that -- here we see stomach content from a mink that was trapped on the Tittabawassee River. You can see the fish -- kind of little fish filets from the minnows. We can do scat analysis. We do prey remain analysis. This is the inside of a Kingfisher burrow and this would be prey remains from a Single Great Horned Owl nest. We also do visual observations. Kingfisher, you can see the fish there, and the Kingfisher burrow has also got video cameras placed in them. At the top, I think is a Great Blue Heron

observation. We do bolus sampling. So here we're actually waiting for the parents of the passerine birds to bring food back to the babies and then we go in and kind of steal the food to see what the parents are bringing back to the babies.

So once we have the site specific dietary composition for each of these animals identified in the field, then we're going to go out and sample those dietary items from the places where they're being consumed and we're going to do that at multiple time points, kind of around spring and summer when we get reproduction occurring, and we're going to do it at multiple locations. I should say we did it at multiple locations. In the green, we have reference areas and that's where we'll take all of our individual and population health measures, and then you have the yellow dots. Those are the specific sites where we've collected specific dietary items. Our sites include just downstream from the Sanford Dam on the Tittabawassee River, the Chippewa Nature Center, and then three sites downstream of the Dow Dam and those would be Smith's Crossing, Tittabawassee Township Park, Freeland Festival Park, and Imerman Park.

So this would be what a typical -- this is an

example of one of our receptor's site specific diet. This is a site specific diet for mink. It just shows that we look at stomach content and scat analysis. We can see that the mink on the Tittabawassee River consume about 52 percent fish, 8 percent crayfish, 19 percent muskrat and so on. Once we have that site specific diet, if we compare that to concentrations that we have in those dietary items, then you can see here there's a significant difference between the concentrations in the reference area and the concentrations in the target area, the target area being significantly higher. Another interesting finding is that the concentrations at our sites in the dietary items increased as we went from Smith's Crossing to Imerman Park.

So we have a dietary exposure and now we do our tissue based exposure. We collect eggs as part of our tissue based exposure assessment. These are Robin eggs, quite easily to collect, of course. A little more difficult is the excavation and entering into the Kingfisher burrow, and even more difficult yet is climbing up in a dead spindly tree to collect Great Blue Heron eggs. It's looks something like that, like little rock stars. We also do nondestructive tissue sampling. Here we see one of our artificial nesting

platforms. That's a Great Horned Owl nestling that's about six weeks old. This is Jeremy taking on one of the Great Horned Owl nestlings. This is at Chippewa Nature Center. He takes one of the Great Horned Owl nestlings out of the nest, puts it in the bag. We send it down to the ground where we take a blood sample which we then analysis for contaminants, and we also look at individual health. So we look for parasites. We do measures of bill length, pad length, eighth primary feather, and we also radio tag these guys and put a U.S. Fish and Wildlife Service band on them to monitor long-term survival.

This is taking a blood sample. I told you there would be good pictures. Here we have a Heron nestling. This is the same thing. We're taking a blood sample from a Great Blue Heron, which is much more difficult of course. This is a view from up on top, and we also do tissue sampling. We do some destructive tissue sampling. This is a mink sampled just upstream from Freeland Festival Park. I think that's Christmas Eve morning, and we also do some sampling of blow down. So this would be a nest of Great Blue Herons that has blown down, and so we opportunistically go out after windstorms and try to collect anything that may have blown down.

So we have our dietary exposure. We have our tissue based exposure. Remember, I told you in our dietary exposure we had an increasing exposure to congeners as they move downstream. As you can see here, the tissue based exposure confirms that. As we see here, the concentrations in the liver of the mink that we collected also increases as we move downstream. So our dietary and our tissue based exposure are lining up, meaning that we have more confidence in both of our exposure assessments.

So just to kind of wrap up on final results, for dietary exposure, all the animals that we selected had significant exposure to the two furan congeners, the primary dioxin-like contaminants on the river, and also we saw that in the tissue based exposure. One interesting finding, by comparing the two exposures, was that while we assume that these were going to be very bioaccumulative and biomagnified, 2,3,7,8 dibenzofuran, especially in mammals, is quickly degraded, about a four-hour half-life, so we're not seeing it as much in the tissue based exposure as in the dietary based exposure, and this may explain some of the toxicity results that we're finding.

So back to our original exposure toxicity. Another thing we can measure, of course, is population

health. We can measure that directly. I'm going to go over a few of those data right now, and how we do that is we measure a lot of different parameters. I'm not going to go through all of them but there is a short list as you see here, and what we going to do is look at studies where animals have been exposed to dioxin and we're going to identify specific measures that are possible adverse effects that have been identified. So this is kind of a short list but it gives you an idea of what we might look at, clutch size, hatching success, fledging success, and population demographics.

So to present some data, this is kind of a busy slide, but the point of this slide is at the bottom we found no significant difference between sites for any of the measures that we looked at for mink individual health. Also a number of mink per kilometer were not different between sites. Male to female ratio was not different between sites, and the adult to juvenile ratio was indicative of a stable, lightly harvested population, which by all rights is what the trappers will tell you we have.

So conclusions from the mink study, no difference between sites for any of the measures we looked at. The mink appear healthy in size, age, and nutritional

status. No adverse measures for any of the endpoints that we measured. Mink abundance was not different between sites. Male to female ratio was as expected, and abundance and population demographics were indicative of a stable and lightly harvested population.

So moving on to passerine reproduction. Eastern Blue Bird, Tree Swallow, and House Wren, essentially, we found minimal effects for these guys. Productivity and fledging success was greater downstream the Dow Dam for Blue Birds for both years that we monitored them. Tree Swallow hatching success was greater in the reference area for just 2006 but productivity and fledging success was not different, and House Wren we saw no differences at all.

So while a bird may fledge, that's not to say that there might not be adverse effects to the bird, so we also want to monitor long-term survival. We do that by looking at band recoveries. We band each bird that we have out there, both the adults that are in the boxes and the nestling, and then we look at from year to year the number of birds that return from their wintering grounds. So for the Eastern Blue Bird, you can see we had a 7 percent nestling return and a 27 percent adult return and you can go down the

line, but these are very high return rates for even an uncontaminated area.

So conclusions of passerine study, all the expected species that we thought would be there are there. We had high nest box occupancy, 82 and 87 percent. No obvious differences in measures of individual health. No obvious differences in population health. No obvious deformities. We monitored over 3,000 birds, and nestling and adult return rates were greater than expected.

Belted Kingfisher, again we saw no difference between sites. We did see a higher abundance in the target area. This is largely due to nesting habitat. Belted Kingfishers need a steep bank to burrow into. There's good habitat on the Tittabawassee River. Habitat upstream is less conducive. So that's likely the difference in the abundance measurements, and we saw no difference in hatching success and really no difference in fledging success.

Great Horned Owl, a similar story as the Kingfisher. We're not sure why, but again we had more nests downstream of Midland in the target area than upstream in our reference area and we had a higher percentage of confirmed success with this. So in summary, no difference in individual health measures.

No difference in productivity. There does appear to be a difference in abundance and density and productivity on a spatial basis with things downstream of the Dow Dam having higher abundance, density, and productivity on a spatial basis.

So we have our measure of exposure. Now we have our measure of population health, and what we don't have is our measure of toxicological profiles. So that's what's next on the list is to identify dose responses. Like I said, presently, there's minimal toxicological data for the two primary furans and those two primary furans effects on the wildlife. There is some data for 2,3,7,8 TCDD, and that's also for chickens and rodents, so we have to try to extrapolate the data, but like I said, we're working on more site specific data for the furan congeners in the relevant wildlife species.

So this is kind of a repeat of my first slide what I was going to tell you and I'm going to tell you again and I hope I've convinced you. For exposure, we have contaminants that are entering the food web. They are entering the food web at a pretty good rate. Dietary and tissue based exposure assessments agree on that. For individual and population health, we found no abnormalities including those associated with

dioxin-like exposure for over 3,000 birds, 250 mammals, 150 amphibians. We're finding that species that should be present are present and the preliminary data, again this is the fourth year of a five-year study, suggests that we have no difference between upstream and downstream in individual health, population health, or abundance of the receptors that we're looking at, the animals that we're looking at.

So for measures of exposure in individual and population health, for measures of exposure, we have a complete data set. For individual and population health, we have one more year of data to collect, and presently, we're working on a weak point in the ecological risk process, which again is the characterization and relevant dose response. Those studies are underway, and we can take questions or do that later.

CHUCK NELSON: We're going to do questions at the end because I want to make sure that we got in all the information. Again I appreciate everyone's patience. There's an enormous amount of information tonight. Lisa, you're the last presenter and you're going to talk about the natural resource damage assessment update.

LISA WILLIAMS: Good evening. We're getting

close. I want to give you a brief update on the NDRA tonight but I really want to focus in on restoration criteria. One of the things we've been hearing about from folks in the community in the last few months, lots a really good ideas on projects that can enhance the environment or other aspects of the community in the area. So what I want to do tonight is give you a perspective on what types of projects fit in with the natural resource damage assessment, and I'm going to start out with just a very brief review of NRDA because it's been a while since we've talked to you and a short recap on the assessment to date, focus on the restoration criteria, and then where we're going next.

When I talk about NRDA, I'm talking about natural resource damage assessment and restoration, what's broken relative to natural resources and their services and what kinds of things we can do to fix it. This is a process that was created by Congress. In addition to the processes that we've heard about tonight, the RCRA process, the CERCLA Superfund process, the removal remediation, this is a separate process but it's still related to the releases of hazardous substances, and in this process, government agencies work together on behalf of the public to

restore natural resources. Again the goal is restoration, and in this case, we're using the term restore broadly. Restore means restore, rehabilitate, replace, or acquire the equivalent of injured natural resources and services they provide to the public.

The kinds of things we've been working on recently, coordinating with the cleanup process, and based on what you've heard tonight, this can be more than a full-time job. There's a tremendous amount of data being generated both on the nature and extent side and the types of work that Matt has just talked to you about. We've been commenting on scopes of work, work plans, sharing data. We've also been, as best we could with the pace things are going, providing input on removal actions as to what types of things might reduce some of the injuries from those processes themselves and ways that restoration might be speeded, including consulting on which plant species being planted will get the most bang for the buck in those areas that have to be restored after removal actions.

We've also been working in technical work groups with Dow in looking at what data is available and what studies make sense to try and determine the amount and types of restoration that need to be done. We focused into three groups, things related to lost human

services, ecological injuries, and restoration. Things related to human services include impacts to the public because of fish consumption advisories or soil contact advisories, the wild game consumption advisories. The ecological injuries, we're looking at the type of data that MSU is producing and literature values and also trying to look at the full range of fish and wildlife resources that are out there beyond just necessarily the species that are being specifically studied, and I'll talk a lot more about the restoration groups when I get into the restoration criteria.

We are planning some additional studies. We'll be coming to a different evening to talk about those, and as a part of setting the ground rules for these technical work groups and helping to provide the Trustees with enough funding to be able to keep up with this process, we executed a memorandum of agreement with Dow to set up this process. The restoration criteria are something that were developed by the Trustees. They're based on a set of broad criteria that are in the regulations for NRDA and we've tailored them more to this site and we think made them a little clearer than they are in the Federal Code of Regulations, and the purpose of these

criteria is to help us filter and screen the ideas that are out there and gather them into a database, those things that might make sense in the NRDA context here at this site, and then ultimately to help us to select projects.

So I'm going to tell you a little bit about what those criteria are. We broke them out into four major areas, and the first one is just basically a screening process, the eligibility criteria, and then we talk about how well those projects are focused on needs at this site, how well these projects might be able to be implemented, cost benefit analysis, things like that, and then the benefits they provide and how those benefits match the needs identified in the damage assessment.

Eligibility criteria, just three here. Is it legal, does it comply with the laws and regulations that are out there. If it's not, then we're kind of done with that project idea. Does it benefit the natural resources that were injured by hazardous substances or the services that natural resources provide? There has to be a link back to hazardous substances, and is it, just as a threshold level, technologically feasible.

Under the focus criteria, is it a project that

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restores, rehabilitates, replaces, or acquires the equivalent of injured natural resources, and we want to focus in on projects that are Trustee priorities. The Trustee Agencies are Natural Resource Managers in this area and have already done work in other contexts, prioritizing activities that are important, so we want to make use of that good work that's already been done, and then we're specifically looking at targeting resources or services that would take a long time to recover on their own. There's no sense in spending time and money investing in things that are going to recover on their own.

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Under how implementable a project is, we're looking at cost effectiveness. We're looking at whether benefits can be measured because we need to be able to know when have we done enough, have we done the right types of things, can we measure what is going to come out of a particular project. This is not a research type program. We're looking to implement things that have a high likelihood of success. We also need to coordinate with response actions. We don't want to do a restoration project that a year later might be torn up, for example. Likewise, if there's a project going out where you've got construction equipment in the field and you need

to do this much to meet the response action objectives, but if you do a little bit more, you get a whole lot of restoration involved without remobilizing equipment later. We want to take advantage of those types of opportunities.

We also want to -- if a project involves some type of source control, something that's very similar to a remedial response activity, we want to make sure that we're really doing what we need to do to benefit natural resources, and then we also are looking at giving projects preference if they're consistent with regional planning efforts that are already underway, and I'll talk about what some of those are that we've already been looking at as resources for information. We're looking for projects to get the biggest bang for the buck, greatest scope of benefits, provide benefits that aren't already being provided by some other program. We're also keeping in mind projects that achieve environmental equity, addressing environmental justice issues, and we want to maximize the time for which benefits accrue.

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We've been compiling lists of projects and ideas and sometimes they're broad concepts, things like the Saginaw Bay Watershed Initiative folks have talked about in their reports, you know, restoration of

wetlands below the 585 contoured line around the Bay, for example, but we're also looking at where people have proposed specific projects that might make sense in this context, you know, specific parcels, in-holdings related to planning boundaries for already State and Federally owned areas, and there are many more ideas that are out there that may or may not fit these criteria well. They may be great ideas. NRDA might not be the way those things get played out, so we also have things in our database that probably aren't going to score very well on our criteria. It doesn't mean they're bad ideas. It just means you're not necessarily going to see them in a NRDA context.

Just so you know some of the places that we've already drawn projects and ideas from, I won't go through the list, but we are talking with these organizations, looking at their reports. So if you belong to these groups and have already submitted your ideas, we've probably got them. If you have additional ideas, working through organizations like this is a really good way to go to get your information to us. I'll also have contact information at the end of the talk and in the handouts if you want to submit ideas directly to us.

We've also heard tonight -- we've talked to you

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before on how NRDA and the RCRA process that are going forward in this area work together, coordinate, and how different parts link together. That really doesn't change with what we've heard tonight on how some of the Superfund authorities are going to be used. Our authorities and responsibilities don't change and we are continuing to work forward with the NRDA as we were before and we're hoping to continue and expect to continue to coordinate data sharing and data gathering efforts with EPA as we've been doing with DEQ under the RCRA process, and along the way, we need to take into account what some of these actions are. The removal actions do things like reduce exposure in local areas and they may also change the way contaminants move in a system if you're changing the hydrology of the river. They're also causing physical alterations of the habitat as we've seen in some of the photographs tonight and those are ways that natural resources are impacted as an indirect result of hazardous substances being out there.

Next steps for the NRDA process. Well, continuing to collect and develop ideas, and again I'll share some contacts with you and information at the end as to how you can feed into that process. Coordinate with response activities as practical, and

I want to add to this first point about continuing to develop and collect ideas, we're also continuing to look at our criteria and match up how those ideas fit with the injuries and the types of problems that we're seeing as a part of the assessment, and one of our goals in the next few months is to have a more comprehensive assessment plan available to the public that we can talk about, this is what we're doing, this is what we're doing, and we'll be coming back to share with you that type of overarching plan as well as specific study proposals.

So to go back to the basic purpose of NRDA is to get to restoration, and what I've gone over tonight are some of the criteria that we use to filter, screen, and select projects. This is a complementary and parallel process. It's also related to hazardous substances, but yet, it's distinct from the cleanup activities, and our projects have to be focused on addressing injuries and services that were lost. I think I probably made that point.

One of the most efficient ways to get restoration project ideas is to contact me. I'm serving as the Coordinator for the Trustees at this point, but if there are other contact folks from the Agencies here that you already have a relationship with or would

rather talk to than me, I'm okay with that. Their contact information is in the handouts as well, and we have a small website that we started, has past presentations that we've made from NRDA, and the presentation from tonight will be up there in the next few days, all things in computer land being friendly to me, and with that, I will turn it back to Chuck.

CHUCK NELSON: Well, it's your turn now. What I'd like to remind you to do is, please, come to the microphone. If you have a question for a certain individual or about a certain subject, say that up front so that person can kind of be ready to come up and respond to you. Folks who are responding, please, come to a microphone so everybody can hear you and it can be recorded by our camera crews.

Because things went a little late on our presentations, I would like to have this public session in session go until 9:30 to give you folks a chance because you've heard an enormous amount of information. So presenters, agency folks, I'm going to suggest that we're going to go until 9:30, not 9:15 as the agenda says, to make sure folks have a chance. Ma'am, you're first. Go ahead.

AUDIENCE MEMBER: I have a question for the EPA. I'm not really good at speaking in public so I

actually wrote something this time to make sure I get all my points in. On behalf of several of the river residents that I know here and myself tonight, I would like to ask the EPA for their help. The Courts in this State have failed the people living with Dow's contamination by not allowing our property damage case to proceed for over four and a half years now and still unable to decide if we should collect and be a class action suit or not. In the mean time, it has been an additional four and a half years that we continue to be exposed by the dioxin contamination simply by living here as documented by the U of M exposure study. Health regulators tell us they do not know what the effect of the additional exposure will cause residents; although, dioxin is a known cause of cancer along with a host of other diseases.

There isn't much of a housing market for dioxin contaminated facilities and indeed a rare individual who is willing to buy such property. I have friends who have abandoned their homes because of the high levels of dioxin found there, along with numerous cancers and illnesses in their family. Their house has been on the market for over two years now. They have cut the price in half and still there are no buyers. It is financially devastating to this retired

family who cannot afford maintaining two properties. Even though I know we are not technically a Superfund site here yet, I would like to ask EPA to enroll residents who want to leave into the Superfund relocation process. I don't know if this is something that's possible but I would certainly ask that you look into it or give me a contact of who I can initiate such steps for those who want to leave.

RALPH DOLLHOPH: I appreciate your question and your comments, Kathy. EPA has experience with relocation of residents in Superfund situations in different scenarios. I believe that EPA can commit to you that we will look into what the parameters in that process are and get back to you to explain those to you and hopefully be responsive to your question. I don't have that information with me tonight but I understand your question and we will look into it and get back to you.

AUDIENCE MEMBER: Thank you.

RALPH DOLLHOPH: You're welcome.

CHUCK NELSON: Next person, please, come to the microphone.

AUDIENCE MEMBER: Well, I want to know, how do you know that Dow Chemical is responsible for all the contamination, especially on the Saginaw River,

because where they're at right now at Wickes Park, that's an old military property there, and then General Motors is also there across the river, and on each side of General Motors, there were two huge garbage dumps that burned with a fire continuously for many years all through the 1950's. So I'm wondering if either the City of Saginaw or General Motors or the military is also going split the cost on this.

CHUCK NELSON: Do we have a response from DEQ perhaps.

AL TAYLOR: It's a great question because there are a lot of industrial properties historic on the Saginaw River as well as some additional ones on the Tittabawassee River. We believe that Dow is responsible for the dioxins and furans that we're seeing at Wickes Park and in other parts of the Saginaw River because we have something called congener profiles of the types of dioxins and furans that were released by Dow Chemical and this is kind of like a fingerprint of the contamination that was released by Dow and it's a very consistent fingerprint starting at Dow and going downstream all the way to Saginaw Bay.

It changes a little bit once you get into the Saginaw Bay because I think we're seeing some other

contributions from some potentially other components, possibly because dioxins and furans can be associated with certain PCBs, but we do see a very consistent pattern starting at Dow going downstream. Upstream of Dow on the Chippewa and on the Tittabawassee River upstream of Dow, we see much lower concentrations, very low, basically State background reference levels, and then we see a difference in this fingerprint in the actual mix of the dioxin and furan compounds. So that's basically how we know, but I think it's a great question, and it gets more complicated as you get into the Saginaw River because there's definitely more going on down there.

DR. RENATA KIMBROUGH: I'm Renata Kimbrough and I appreciate your comments, because dioxins and furans are the product of fire, and if there was a fire that went on for several years of these old landfills, you might actually have a point and that should probably be investigated further.

AUDIENCE MEMBER: Terry Miller, Lone Tree Council. I had a question. I'm not sure who would be able to address it. I suspect the DEQ, and it's related to the MSU work. I think the public is getting some mixed messages here and I would like some clarification. The State hired an ecological expert,

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Dr. Galbraith, several years ago who indicated that

the dioxin was a problem with wildlife, and subsequent to that, Dow Chemical hired some ecological experts that indicated with their data, not necessarily with the headlines that Dow originally obtained, but with the data that ended up with the -- I guess it's the second wildlife consumption advisory administered by the State because of uptake of dioxin in the floodplain, and now if I'm hearing correctly, Michigan State is coming back with this four-year study suggesting that they're not seeing much in terms of consequences out there. Perhaps I'm misinterpreting it, but could somebody address what appears to be a contradiction between sets of data here.

CHUCK NELSON: DEQ, do you want to take this, but I know the folks from MSU wanted to say something, too. Who would like to go first?

AL TAYLOR: Not hesitating to defend myself, I'm a geologist, not an ecologist, but I have become a little bit familiar with Hector Galbraith's work. He has conducted the reviews that you're speaking of, and in fact, most of the predictions that Dr. Galbraith has made about concentrations increasing or being present in the food chain and in tissues are, in fact, I think being borne out by the MSU work. We recognize

that MSU has got some preliminary conclusions that

look, you know, pretty good with respect to, you know, the population based wildlife. This is a difficult process for us, but this is a nonconventional ecological risk assessment. It's not being conducted in the same manner that other ecological risk assessments that have been done in other areas have been done, so this is rather new. It's under review. We'll, of course, look at all this information that's being provided. We'll probably be providing some additional comments from our ecological contractors, Hector Galbraith, and I'm sure EPA has already provided us with comments and concerns with respect to the type of approach being used. So it's -- for us, we're still in the review process. We think there's a lot of tremendous information that's being developed as part of the MSU process. To the extent that we're going to be able to use that to make risk management decisions, we'll use it, but we may need to get some additional information as well.

AUDIENCE MEMBER: Are you staying the State didn't originally approve the design of the project?

AL TAYLOR: No, we did not. In fact, in 2003 when it was proposed, we specifically didn't approve it, but it was going through as a -- at that

time anyway, a grant proposal from -- you know, a

grant funding from Dow to MSU, and we have not approved it yet, but we think there's a lot of merit in some of the work that's being done there. Again we can't be completely responsive to, is this going to solve all of our ecological risk assessment problems. We don't know the answer to that question. I think maybe -- I don't know if someone from EPA wants to provide something additional. We see the same issues. For us, this is going to be a human health risk assessment, an ecological risk assessment, and then resource issues, and making fishing advisories and wild game advisories. So it's going to be kind of integrated packaging. We're going to be considering all of that information with our new partners.

AUDIENCE MEMBER: They have not addressed the wild game issue which the Dow -- other Dow funded studies looked at, wild turkey and deer?

AL TAYLOR: That's right, but there is additional data being developed to further understand that issue, so additional deer, turkey, and I believe some other animals. Some waterfowl and rabbits I think have been collected and that information is going to be thrown into the mixture.

DR. MATTHEW ZWIERNIK: The wild game was a

human health exposure, human health risk assessment.

Part of the reason why I think you -- there's some confusion is -- well, two reasons. One is that Dr. Galbraith didn't have a lot of data to go on. He had some fish data, but he had no actual measured population out there, individual health data. He also didn't have site specific diet, so he had to go to the literature to see what a typical diet was. He didn't have a lot of those dietary items. So when you don't have a lot of data, you have to error on the side of safety. So when you put something out there, you want to make sure that you're always overestimating or being -- not overestimating, but being conservative. So in that way, you're going to come out with predictions or conclusions that would state risk being -- usually being higher than when you collect more data as a general rule. Now Dr. Galbraith's data does, like Al said, mix with ours, in that, we are seeing the furan congeners and the dioxin congeners moving up to the food web for the ecological part of the study, so for the animals, but what we're not seeing is the adverse effects that you would expect for seeing those contaminants move up in the food web and that may be just a toxicological issue or it may be that -- I talked a little bit about the congener

3,7,8 tetrafuran, especially in mammals, appears to be

quickly degraded, about four-hour half-life, in our mink, and that may have something to do with it as well. So we're not seeing bioaccumulation anytime that the food web path goes through mammals. So Great Horned Owls, even to a lesser extent some of the fish eating birds, are not bioaccumulating those. We're not seeing the exposure that we expected to see which may also explain some of what's going on.

AUDIENCE MEMBER: I'm afraid I don't understand how dioxin is going to be around for 100 years and it can a half-life in an animal of four hours. If dioxin is going to be in the ground and the water and watershed for over 100 years, how can this only have a four-hour half-life when it goes through animals?

DR. MATTHEW ZWIERNIK: In animals, we have specific enzymes that are designed to degrade. We don't know if they were designed to degrade, but degrade polynuclear aromatic hydrocarbons. The enzyme is called Zycrome T450 (sic).

AUDIENCE MEMBER: This isn't something that animals would normally eat, that animals should normally be exposed to.

DR. MATTHEW ZWIERNIK: The enzyme was

probably used historically for a different compound.

It just happens to be degrading to furan.

AUDIENCE MEMBER: But the wildlife like in Imerman Park, which I am familiar with, I have never seen a rabbit, a squirrel, a chipmunk, a song bird, an owl, a mouse, even back in the trails, and I know the dog park was primarily moved from the back of the park to the front of the park. Why was that done if there was no, you know, there was no risk to dogs or animals?

AUDIENCE MEMBER: We spent quite a bit of time in Imerman Park as well. That's one of our dietary sampling areas. So we sampled all kinds of things, including small mammals, white footed mouse. We also sampled rabbits just upstream a little ways at Vaughn Dietzel's property. They have an active Great Horned Owl nest that fledged two nestlings at Imerman Park last year and two more were fledged at Vaughn Dietzel's this year. So there's active wildlife population here. You may not be seeing it but it's there.

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AUDIENCE MEMBER: It must be because of the dogs.

DR. MATTHEW ZWIERNIK: Also we have bird boxes at Imerman Park, if you check the bird boxes.

Like I said, we have about 87 percent occupancy rate.

CHUCK NELSON: Other questions or comments, please, come to the microphone. Come to the microphone. You can line up if it's easier to do it that way, and again this is to ask about any presentation. Ma'am, why don't you go first. Then, John, you'll be next.

DENISE KAY (ENTRIX): I'd like to make one more quick response to the previous comments about things matching up between the Galbraith assessment and what Dr. Zwiernik is finding in the field, and in fact, they are matching up to the level of -- they are seeing dioxins and some of the furans accumulating in the food chain, but there is an order of magnitude or two orders of magnitude difference between what was predicted by the Galbraith assessment using the data he had from soil, fish, and some bird eggs, and using the measured site specific data. So there is accumulation in the food chain but the difference in what's measured versus what was predicted is an order or two orders of magnitude.

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TOM LONG: What is an order of magnitude?

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DENISE KAY: Oh, excuse me, an order of magnitude is ten-fold. Two orders of magnitude would be a 100-fold difference, and in some cases, it's

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1000-fold difference. Also in response to the question of why -- when you've heard that dioxins could be present for 100 years, Matt is saying that there's a half-life of four hours, that's a very important distinction. We use commonly the term dioxin-like compounds, but what it is comprised of is 17 different actual chemicals. Some of them are called dioxins and some of them are called furans. The predominant dioxin-like compounds in this river system are not actually dioxin congeners. They're furan congeners, and that is a novel finding, in some of the MSU research, is that these furan congeners actually have a shorter half-life in the mammals than you would have thought, being that they're a dioxin-like compound and what is known about dioxins, dioxin proper congeners.

CHUCK NELSON: John.

AUDIENCE MEMBER: John Witzke, Michigan United Conservation Club Director in this District here. My question is to the EPA, please. What I'd like to know is if they are going to follow up with the DEQ's commitment to human health issues, mainly maternal body burden and the effect of the human fetus. Our State DEQ has committed to that and we

want to make sure that that is not bypassed by the

Federal Government. That is also in the agreement, Chuck, signed between DEQ and the Dow Chemical Company to study and resolve that issue.

CHUCK NELSON: Could you folks who are responding use the microphone up here because it's a bit louder and I think that folks will be able to hear a bit better? So whoever is coming to respond, can you come up here and use a microphone that has a little better volume? Natalie is having a hard time hearing what people are saying for her transcript.

DEB MacKENZIE-TAYLOR: John, I'm with DEQ. I'm Deb MacKenzie-Taylor. I'm a toxicologist with DEQ.

AUDIENCE MEMBER: I understand you're with the State, Deb.

DEB MacKENZIE-TAYLOR: Yep. I just wanted to make it clear so EPA understands what our commitment was, that we would make sure that any evaluation of human health would include exposures through moms to the fetus and related health effects and make sure that those are adequately protected in any human health risk assessment that's done.

AUDIENCE MEMBER: That was included with discussion with EPA?

DEB MacKENZIE-TAYLOR: And I believe EPA

will do the same thing. Their risk assessment is going to look at cancer and noncancer health effects, and the noncancer health effects that are going to be the most predominant or the most sensitive are going to be those developmental effects on the fetus from exposure.

AUDIENCE MEMBER: Again we've seen a lot of information, a lot of spin on the studies, and so on, but it seems to me like the human health issues have taken a back seat and we're very concerned about that. We don't want them being forgotten. Under the agreement, it's supposed to be resolved.

DEB MacKENZIE-TAYLOR: Well, the human health risk assessment is ongoing. There were some submittals and some responses in the past couple of months, so it is ongoing. It's not resolved yet but we're working towards it.

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CHUCK NELSON: From EPA, if you could come up and respond, that would be great. Thank you.

DR. MILTON CLARK: I'm Milton Clark with U.S. EPA in Chicago, just by way of background, been working on dioxin issues including at Dow Chemical since 1981. In addressing your question, whenever we look at these types of sites, and that is particularly

where people are eating fish or exposed to soils, we

always routinely take a look at what are the human health impacts, for instance, to the developing fetus or to the developing child. For instance, in the Fox River, we used a very explicit approach to be able to make that assessment by adding in that additional risk. Now this is not an easy thing to do from a quantitative nature but it is a routine that we do, in fact, use. We also consult with the Agency for Toxic Substances and Disease Registry on this type of methodology and then also work with the Michigan Department of Community Health. So to answer your question, yes, this is exactly what we do in our risk assessment procedures. We've done this for 25 years. We will, in fact, be doing that up here working with other Agencies.

AUDIENCE MEMBER: Thank you for your response. My concern was -- sir, my concern was that Dr. Linda Birnbaum, your Chief Toxicologist in Virginia *[sic]*, corroborated our question about losing something like 40 percent of female fetuses within approximately 6 weeks and they do not know why. Now that's why my concern is about the human health issue and the maternal body burdens.

DR. MILTON CLARK: You know, we certainly

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appreciate you bringing this up. We're going to be

having other forums where we'll be going into these types of issues in more detail. Dr. Linda Birnbaum as you mentioned has been here. She and other people, including myself, can, in fact, come and we'll expand upon this in future sessions.

AUDIENCE MEMBER: Fine. Thank you very much. Chuck, can I address the fish and wildlife or do you want me to come back?

CHUCK NELSON: Could you come back? You got somebody behind you and this lady had a comment also but I'm going to take your question behind first. You were very patient --

AUDIENCE MEMBER: I would just like a clarification about some of the data that was presented with the MSU study. I was at the Dr. Galbraith presentation years ago, and this is a bit rusty, but I believe he described the concept of a population sink, and in that process, it's natural for population of wildlife, either through competition, death, for whatever reason, that as they move out normal populations move back in and fill that niche, and the data that was presented today, my question is, was that based on specifically the tagged specimens that returned or was this a composite of all those

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animals, including I believe one slide showed only 27

percent return rate, meaning that 70 percent or more were new animals coming in from the outside, and is your data skewed based on that normal population?

DR. MATTHEW ZWIERNIK: -- good question. That is a concept that we have to deal with, in that, we could have a population where individuals are dying and then new individuals are coming in, and we look at that concept in a number of ways. We could look at it first, like I said, long-term survival. We do have band return rates. You talked about 27 percent return rate which you didn't think was very high, but realize that the adult -- the life expectancy of those passerine birds is three years. 90 percent of them don't make it past the first year. So when you look at other studies that have looked at return rates in an uncontaminated environment, those return rates are quite high, and those are bands and band numbers of the birds that left and came back. We also do long-term monitoring with radio tags, so we have radio telemetry tags. We have color band tags. We have Fish and Wildlife Service tags that we also monitor long-term survival of say the Great Horned Owl or the Great Blue Heron or the other species that we look at. We also look at population demographics that will show

you some of that data. So we look at age structure,

and if you had adults that were dying prior to, you know, earlier than old age, there is a shift in that demographic. If you have adults that can't reproduce, you'd have a shift in the other direction, and we don't see that either. So like I said, there's a number of ways that we can investigate and see if that is, in fact, happening, and we're trying to use all those methodologies to do that.

CHUCK NELSON: Ma'am, go ahead.

RENATA KIMBROUGH: I would like to respond to the comment about the miscarriages and I think there might be a misunderstanding because it's normal that women, particularly in a very early period of pregnancy, will lose their baby, up to 50 percent, and so that's what happens normally. That has nothing to do with dioxin, and maybe the gentleman misunderstood what Dr. Birnbaum said, and I just wanted to clarify that. That was one point. And the other point is that the University of Michigan has done a very extensive exposure study and the primary investigator is actually here in the audience and maybe he wants to say something also, but I have reviewed a lot of the data and the levels that have been found in the people in the area that is supposedly contaminated and then

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also in a controlled area is really quite similar and

it's also similar to what you find in the general population in the United States. So before you can have any disease or any illnesses or whatever you are concerned about, you have to have exposure. Otherwise, whatever ails you has nothing to do with dioxin.

CHUCK NELSON: Are there other questions or comments? Sir, you want to respond for EPA. Why don't you come up here. Appreciate it.

DR. MILTON CLARK: The University of Michigan dioxin exposure study we are also interested in those findings. We have been unable though to get the necessary data from that study to really be able to draw a firm conclusion and we hope to be able to do that in the future. What that study does, in fact, show is that people who are consuming fish from the Saginaw River system and have done that for a number of years do, in fact, have levels of dioxin that are elevated over those that are not doing fish consumption from that system. Any elevation of dioxin above background is a concern to us because even background levels pose potential risks.

CHUCK NELSON: Dr. Garabrant, would you like to respond?

DR. DAVID GARABRANT: Yes, thank you. David

Garabrant. I'm the PI on the University of Michigan study. Milton, the EPA has never requested our data, okay, so it's not that you're unable to get it. In fact, we have a meeting scheduled with your staff to present the results.

DR. MILTON CLARK: That would be great.

DR. DAVID GARABRANT: Well, we have that scheduled in a few weeks. We would very much like to present the results of the study and go over the data with the EPA. We feel that this is extremely important to the work that you're trying to do. The second point you made, consumers that feed from the Tittabawassee River have elevated levels of dioxins in their blood. The results on that issue are -- all of the following are fair to say. There are small elevations in the blood content of TCDD among people who have historically consumed fish from the Tittabawassee River but not for the total TEQ, okay. They are small, and when you look at the amount of variation in the serum dioxin levels explained by that consumption, it is quite small. So, yes, we found it because we have a very large and very well conducted study but the effect is quite small.

DR. MILTON CLARK: Just one very quick

follow up. Do you have information statistically on

the amount of fish that people are eating and have broken that down into percentiles? That would be my first question. The second question is, is your population large enough in your opinion of the fish samplers that you did gather to be able to bring in to your evaluation what are truly the upper end of fish consumers in that region? What sort of limitations or advantages in your study do you see?

DR. DAVID GARABRANT: The answer is, yes, we did ask people how much fish they consumed. We asked them species by species what they ate from the Tittabawassee River, from the Saginaw River, and Saginaw Bay. We do have that. In fact, the results of all of those questions are posted on our website. They are publicly available. Anyone in the room who would like them as well can view them and download them. Our website is www.umdioxin.org. It's all there. The numbers of people who consume fish, just from memory, I want to say that's something like -- it's above 90 percent of the population in the region eats fish and a sizable proportion of them consume sport-caught fish from -- well, not so much in the Tittabawassee. There's a lot of walleye taken from the Tittabawassee, very few of the other species,

because, of course, there have been fish warnings on

the Tittabawassee for over 20 years, but consumption of fish from the Saginaw River, Saginaw Bay, sport-caught fish is quite common, and, yes, we have quite a few people in the study who answered that they ate it.

CHUCK NELSON: Other questions, comments, please, come to the mike.

AUDIENCE MEMBER: I think it's my anointed position at every one of these meetings to ask you the same question. The EPA may not have requested the data, Dr. Garabrant, but I know that the State has. So I'm going to ask again of the State, have you received, that is the State Department of Community Health, have you received all the analysis, all the data of Dr. Garabrant's study that we frequently ask for at this meeting?

CHUCK NELSON: Terry, the problem with the Department of Community Health folks is the three of them had to leave. They have a 7:00 a.m. meeting in Washtenaw County about mercury tomorrow. They gave me an 800 number for people to call. They apologize but they patiently stayed as long as they could and they had to scoot. So maybe somebody from DEQ can answer your question, but they asked me to apologize.

DEB MacKENZIE-TAYLOR: Terry, some of the

stuff was done that we asked for, and one of the things that we asked for that we didn't have the last time that we talked about was the soil concentrations by looking at different soil concentrations and they have done that. One of things that we've talked about with them and the SAB just a couple of weeks ago was that their categories, their low concentration was very low, their middle concentration I believe was pretty low, too, and they don't have that many people that were exposed to high concentrations in the soil, and so they're looking at that, and this was something we discussed with them with their SAB a couple of weeks ago, whether they really have enough people with elevated -- rather elevated soil concentrations to be able to see much in their study group, and David, you're welcome to respond to that, but that was one of the discussions we had recently with them and how maybe we could look at that a little closer.

DR. DAVID GARABRANT: We had a meeting with our Scientific Advisory Board to which we invited stakeholders, including the Lone Tree Council, two weeks ago. DEQ and DCH, Dow and EPA attended that meeting, and we spent a full day presenting the results and discussing what more needed to be done.

First off, I think we have done the analyses requested

by all of those parties. The issue that Deb is referring to is the following: First off, when we looked at the relationship between soil dioxin levels and blood dioxin levels, and this is all on our website, you're welcome to have it, it's there, there's virtually no relationship, okay. Now that's looking at soil as a continuous variable and serum as a continuous variable. We've done the analysis another way. We've said, well, you know, it might be that there's some nonlinear relationship, so let's categorize the soil into high, medium, and low. Again we found no relationship with serum, okay. Now what Deb is referring to is, how did we choose the cut points for high versus medium versus low, and we did what I think is a very good statistical method. We said the high is the 90th percentile and above of the soil levels. The median, the middle category, is from the 90th percentile down to the median, and the low is the lower half. We found no relationship. Now Deb is correct, the 90th percentile soil concentration is still not a huge value. What that says is that 90 percent of the population has values that are -- I wish I had the pictures in front of me and had the numbers. For TCDD, I'm doing this from memory,

perhaps 6 or 7 parts per trillion. Only 10 percent of

our population in our study had soil values above that, all right. What the DEQ would like is another analysis where we choose a much higher cut point, and we're happy to do that and we will do that promptly. The limitation of doing that is the number of people above that cut point will be very small because only a very small proportion of the population has soil above that level, and so we will do it. We are happy to do it. I think it's a great idea, and if there is some relationship there, we will see it. Now having said that, in the linear regression analyses, we've also looked at the residuals, okay. It's one of the diagnostic measures when you do linear regression. Those linear regressions are not in error because of some outliers at the high end that we've modeled improperly. So we're going to do what the DEQ has asked. I will speculate up front that it's not going to give us a different answer but we're happy to look.

AUDIENCE MEMBER: Many of the people who live in the area above 7 to 10 parts per trillion are at a meeting like this. They would like information that perhaps a little more empirical and a little less statistical.

DR. DAVID GARABRANT: Are you talking about

7 to 10 for TCDD?

AUDIENCE MEMBER: TEQ.

DR. DAVID GARABRANT: Oh, TEQ, no, that's much different. I was talking about TCDD. For TEQ, same answer, we used the 90th percentile, but, yes, the scale is much higher, but it's the same issue. If we moved it past the 90th percentile to say the 95th or, you know, the 98th, would we see something different among those people with the very highest levels?

AUDIENCE MEMBER: David, do you recall what the 90th percentile concentration was? I thought it was below 90.

DR. DAVID GARABRANT: I do not recall. If there's a web connection here, we could go to the website and find it. It's on our website. I'm not sure that we should take the time. The point is that DEQ has asked for analyses. I think it's a good idea. We're happy to do them. We've looked at this now -- actually, we've looked a third way using yet another statistical approach, logistic regression. We're getting the same answer, soil does not relate to blood. When you live on contaminated soil, it has little, if any, to do with what's in your blood.

AUDIENCE MEMBER: But, Doctor, you haven't

looked at people that live in soils above 90 parts per

trillion or in excess of that.

DR. DAVID GARABRANT: Oh, we certainly have.

AUDIENCE MEMBER: You have?

DR. DAVID GARABRANT: Yes.

AUDIENCE MEMBER: There's some but it's not a lot.

CHUCK NELSON: Could you guys come to the mike because this is not very effective for the rest of the folks here? We've got somebody who's been very patiently waiting, so I want to try and wrap this segment up.

AUDIENCE MEMBER: Terry, they do have people that are above 90 and a few above 1,000. It's just there's not a lot of them, and that's the concern that maybe we're not seeing an effect because we don't have very many people, and remember, and David, you can correct me if I'm wrong, the evaluations they've done is looking at the whole study group together in evaluating how things have -- I know the regression analysis is looking at concentration base but -- I'm not a statistician or an epidemiologist.

DR. DAVID GARABRANT: As I recall, the logistic regressions look at people who are above the 90th percentile for soil.

AUDIENCE MEMBER: Is somebody looking up

what that concentration was for the TEQ?

JOHN MUSSER: I can get it on-line if you want.

AUDIENCE MEMBER: I don't think it's critical but we can address this but it wasn't very high if I recall.

DR. DAVID GARABRANT: I have it on my laptop. I'll look.

CHUCK NELSON: Sir, you're next.

AUDIENCE MEMBER: My name is Bill Egerer with Midland Matters and I have a question for the EPA folks. The main question that I think keeps coming up from most residents is, is it safe, and my question centers around risk analysis, and I've asked this question at several previous meetings, but now that EPA is taking more of the reigns, I'd like to ask them this question.

And that is, is the risk analysis approach that you're going to use on this project going to be published and what will the factors be, what will the weights be, and how will you be engaging public input on that risk analysis? Because there's a lot of us who think that there's a lot of activity going on that's much to do about nothing.

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WENDY CARNEY: If EPA proceeds out at the

site with a remedial process, there will be a risk assessment which gets done as a part of that process. The Superfund Program has well established published national guidance that it uses for purposes of conducting risk assessments. Any risk assessment that we would conduct at this project would be consistent with that.

We look at a multitude of exposure pathways. We have relatively standard parameters in terms of input values for a lot of things we might look at, ingestion rates, things of that nature, that go into calculating risks at the site. There are -- it's hard for me to sort of describe in detail what exactly would go into the risk assessment, but I can assure you that the process is well established. It's been used within our program for a number of years and that there is well established, publicly available guidance on our risk assessment process.

AUDIENCE MEMBER: Would we have to ask for a study, for instance, the U of M exposure study of Dr. Garabrant's? Would we have to ask that that be included and strongly considered or would that be automatic under your current process you're talking about?

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WENDY CARNEY: EPA does what's called a

baseline risk assessment. What we're looking at is establishing whether or not exposures to various media at sites would result in what we consider to be unacceptable risks based upon standard input values. It looks at things in the absence of taking any action. So the goal of the risk assessment is to define whether or not there's a need to take an action out at a site for purposes of protecting people long-term well into the future.

AUDIENCE MEMBER: Who decides on what those values are, protection as you describe it?

WENDY CARNEY: The Superfund Program has -- by statute, we define an acceptable range of risk to be anywhere between ten to the minus four and ten to the minus six in terms of excess cancer rates, one excess cancer rate per 10,000 to a million.

AUDIENCE MEMBER: But isn't your risk assessment 21 years in the making and it really hasn't been settled yet?

WENDY CARNEY: I think you're referring to the dioxin reassessment?

AUDIENCE MEMBER: The dioxin reassessment, that's true.

WENDY CARNEY: The dioxin reassessment is a

very -- deals with essentially the -- what the

toxicity value is of dioxin. That is just one parameter that gets inputted into a risk assessment, and even though that dioxin risk assessment or the reassessment of dioxin has not been completed by EPA, EPA is still continuing to do risk assessment, evaluating dioxin and making decisions on clean up in the absence of the completion of that risk assessment.

AUDIENCE MEMBER: Well, I know you're doing that but it's been almost 18 months since the National Academy of Sciences provided you with guidance to finish the job, and is it going to be finished before you make your determination on this risk assessment?

WENDY CARNEY: I don't believe that it's necessary to have the dioxin reassessment completed in order for us to proceed with our process and for us to move forward with doing a risk assessment at this particular site.

AUDIENCE MEMBER: Can you publish a letter stating why it's not necessary?

WENDY CARNEY: The reassessment speaks to one factor in an entire risk assessment process. What EPA is doing is that we are continuing to assess dioxin, the toxicity of dioxin based upon the information that has been used historically to assess

the toxicity of dioxin and we are calculating risks

based upon that at this point in time.

We also acknowledge that there is a reassessment that is occurring out there, and that when and if that reassessment is ever finished that EPA will at that point in time factor that in and consider that into the process basically at the sites that we're looking at.

AUDIENCE MEMBER: Thank you.

CHUCK NELSON: Next.

AUDIENCE MEMBER: Robert Cowling. I live on Midland Road. I just got a question about the MSU study and I guess tangentially about the U of M studies that dealt with animals. Were they looking -- was the MSU study in particular just looking at the raw numbers, the raw data, of TCDD and some of the other components, and were you looking also potentially at metabolites if you're saying that the half-life is, what was it, like four hours, and then also are you looking at or looking for systemic developments that have been the hallmarks of dioxin contamination in animals?

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DR. MATTHEW ZWIERNIK: So your question is, are we looking -- when we look at exposure profiles --

AUDIENCE MEMBER: Were you looking at just

like the TCDD concentration in the animals?

DR. MATTHEW ZWIERNIK: No. We look at -- when you saw the data, that was total TEQ, so we look at PCBs, all the dioxin-like PCBs, furans and dioxins when you're looking at total TEQ exposure.

AUDIENCE MEMBER: Okay. And I believe you said that the half-life you're showing is --

DR. MATTHEW ZWIERNIK: Of one of those.

AUDIENCE MEMBER: -- four hours?

DR. MATTHEW ZWIERNIK: One of those congeners, 2,3,7,8, which makes up -- in say exposure to mink makes up 30 percent of the total TEQ exposure. The half-life in mink once it's consumed is about four hours.

AUDIENCE MEMBER: And yet, in humans, it's a little bit longer than that?

DR. MATTHEW ZWIERNIK: No. The only mammal model we have right now is mink. Now Dr. Galbraith may be able to look at some of that -- you know, look at exposure and see -- I'm not sure if he found any tetra in any of his blood samples for humans, but you could take a look at that data and see if you can mine some of that.

AUDIENCE MEMBER: Okay. My question, your study basically comes out with the conclusion that

there really isn't a pronounced or profound effect on

the stratospheric contamination that we have here, the massive levels. That basically one could look at your presentation and assume that really there isn't any effect or a very muted effect on the wildlife in the area, and I guess what I'd like to hear is if you guys look for anything else, because I know that in humans you take a medication and oftentimes it's not that compound that causes the effect. It's the breakdown in the body and what it turns into, i.e., a metabolite, that actually does the pharmacological effect. So I guess that -- your presentation kind of got me thinking, if you're not really seeing high concentrations of the root chemicals, the compounds, the dioxins and furans, are you looking for also metabolites and potentially looking for any of the hallmark effects that other researchers in the past have seen in wildlife populations that have been either purposefully or accidentally contaminated?

DR. MATTHEW ZWIERNIK: Good question. When you talked about other possible effects, now like I said, the direct thing that you want to measure is population health and individual health, and that's going to -- that is an outcome of the exposure and it could be an outcome of a metabolite. So if you're

looking at population health and effect, you should

cover any adverse effects that you're going to see from the exposure but not -- I guess not directly linked to it. You're going to pick that up in your population level, in individual level health effects.

AUDIENCE MEMBER: Well, you mentioned that enzyme level. There is an enzyme that specifically -- or at least, you know, my interpretation was that it specifically targets dioxin or dioxin-like compounds in mink I think it was. Did you test for elevated levels of that particular enzyme?

DR. MATTHEW ZWIERNIK: We are testing for levels in some of the species we're looking at for elevated concentration of that enzyme, yes, but that's not really -- that's not really going to tell us a whole lot other than that they have been exposed. That's kind of a method of testing whether exposure occurs. That's not really a good method of testing whether we have effects. The better method of testing effects is to actually look at the wildlife population and see if we have effects. So again those are the most important measures and it should take care of all the other things that are coming into line.

AUDIENCE MEMBER: Okay. But I guess what I don't understand then is that if you test a certain

population or a certain species of animal and you see

extremely high levels of this enzyme but you really don't see widespread effects through the population, wouldn't it be safe to assume then that extremely high levels of that enzyme were the direct result of extremely high exposure to contamination and that potentially the enzyme is functioning as it should and is actually helping to provide some level of immunity as it were to that particular dioxin in that population?

DR. MATTHEW ZWIERNIK: Yes. There's a couple of jumps there, but, yeah, you're kind of on -- you're on the right track here. If you do get high enzyme reduction for one of the congeners, 2,3,7,8 tetra, the higher the enzyme reduction -- the higher the activity of that enzyme, the quicker it's degraded, and we have looked -- we do have data from the laboratory to that effect, so, yes, but there are some other issues that -- there's more than that single congener out there and that enzyme doesn't act on those other congeners very well.

AUDIENCE MEMBER: But according to the fingerprint as well, there are certain congeners of dioxin that are much higher percentages found in the environment than others. So I don't know. It just

seems logical to me but then I don't have a Ph.D.

either, but you know, it just seems really strange. We're living in an area that has massive contamination of many different dioxins and furans and that there are some effects that are being seen in the human population, and according to your presentation, the effects are extremely muted, and so that leads me to believe that either you're studying the animals that are naturally immune to certain dioxins or furans or that somehow all the animals that were here disappeared and animals from outside of the area somehow came in.

CHUCK NELSON: We're going to have to wrap up in five minutes. You got one person behind you who needs to have his say, so go ahead.

AUDIENCE MEMBER: Sir, I'd like to ask you a question. You said to refer to the trapper. Well, I was the trapper, former trapper. I've lived on the Tittabawassee River now for 45 years and I did trap muskrat and I did trap beaver. 15 years ago, they ceased to exist, and why, I have no idea why that happened, but the mink is more like a rodent, like a skunk, and I was wondering why you didn't go look for beaver and muskrat, but I see did see a muskrat last year so there are signs that they're coming back.

DR. MATTHEW ZWIERNIK: We did trap muskrats.

We trapped I think 50 muskrats along the river as part of the food items for mink when we looked at the dietary exposure. When I had it up there, you saw that the muskrat was I think 19 percent of the mink diet. So we did trap muskrat along the river and were very successful at it.

AUDIENCE MEMBER: I'm glad to hear that. One of the things you said is you stopped at Imerman Park. I wondered if you would consider coming from Imerman to St. Andrews to Green Point and study the animals in that area?

DR. MATTHEW ZWIERNIK: The study site has been extended downstream to the Shiawassee Wildlife Refuge. We're doing work there now, a significant amount of work. Also we did some sampling at Shiawassee for dietary, at Shiawassee, at Veterans Memorial Park, and then down at the confluence with the Bay, just upstream of the boat launch and next to the Dow Lighthouse, and we also are looking at population health of passerines and Great Horned Owls downstream as well, at Shiawassee and at the Lighthouse property. So we are moving -- we did move downstream. We're only two years into that work so that's very preliminary.

AUDIENCE MEMBER: Well, I hope you continue

to stay on the Tittabawassee River from M-46 to the mouth of the river. Thank you.

DR. MATTHEW ZWIERNIK: You're welcome.

CHUCK NELSON: Ma'am, you're going to be the last one. We're just wrapping up here, so go right ahead.

AUDIENCE MEMBER: I'm Ruth Averill. I'm the Chairman of the Saginaw County Parks Commission and we gave permission for them to do the testing at Imerman Park and I do know the postings are there. We made sure as the Commission that they are there. My question is, are the postings for the fish advisory at the other parks visible for people? Particularly, I'm from Tittabawassee Township, are they there?

AL TAYLOR: There are signs posted at parks for most of the parks in Tittabawassee Township. There's a Township park where a number of signs have been removed up at the corner of kind of M-47 and Saginaw Road, kind of that little park that's relatively new. That was a well posted park. Signs have been vandalized or removed or stolen from that park. They are in the process of being replaced. We have also had signs placed at Freeland Festival Park. That has been an ongoing problem because the signage

is not what we thought we were going to get from

Freeland Festival Park and Tittabawassee Township. We want the signs directly adjacent to the boat or the fishing dock so that people can readily see them. When they were replaced there, they were placed kind of at the entrance where no one can see them. So that is going to be revisited, let's say, with the Township.

AUDIENCE MEMBER: So do you need residents to go into the Township to voice their opinion on that?

AL TAYLOR: I think we just need to reapproach the Township first as an Agency and say, we don't think where the signs got posted are adequate. They need to be posted down at the entrances to the fishing dock so that people who fish can see the signs.

AUDIENCE MEMBER: There is a fence of wire across where they go down to fish. Is that still up?

AL TAYLOR: I don't know.

AUDIENCE MEMBER: A gate? That was my other question. Thank you.

CHUCK NELSON: Okay. I want to thank you all for coming tonight. The next community meeting will be on February the 7th in this room. I also would note that the folks from the DEQ, from the EPA,

from Dow will stay around for a while longer to talk to you if you have detailed or individual questions. I would also pass on that the Department of Community Health's 800 number is 800-648-6942 if you wish to contact them. Thank you. Good evening.

(Proceedings concluded.)

STATE OF MICHIGAN)

)
COUNTY OF SAGINAW)

I certify that this transcript, consisting of 123 pages, is a complete, true, and correct transcript of the proceedings and testimony taken in this case on November 28th, 2007.

I also certify that I am not a relative or employee of or an attorney for a party; or a relative or employee of an attorney for a party; or financially interested in the action.

December 7, 2007

_____
Natalie A. Gilbert, CSR-4607, RPR
Notary Public, Saginaw County, MI
My Commission Expires: 8-10-2013

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